INSECTS OF MICRONESIA
Diptera: Muscidae[1]

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INTRODUCTION

Micronesian Muscidae have been little studied taxonomically and, aside from a few lists and economic reports, only four papers have been published on them: Malloch (1923), Bohart and Gressitt (1946, 1951), and Sabrosky (1949).

In the present paper, 84 species in 24 genera are keyed and described; of these, 49 species (58.3 percent) are believed to be new.

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, and Bernice P. Bishop Museum have made this survey and publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175.

Dr. R. Foote and Mr. C. W. Sabrosky made much additional material available from the U. S. National Museum and were very kind in providing certain literature not otherwise available. The U. S. Army Chemical Corps most generously permitted me to have temporary duty to make a Bonin Islands survey. I wish also to thank the officers and men of the U. S. Navy Facility on the Bonins for much help and hospitality. The authorities of the B. P. Bishop Museum generously provided equipment for this survey; to Dr. J. L. Gressitt I am especially grateful for much help and hospitality. As usual, Mrs. Marguerite J. Snyder spent long hours typing preliminary drafts of this paper for which I am very grateful.

The following abbreviations are used to indicate institutions where specimens are deposited: US (United States National Museum), BISHOP (B. P. Bishop Museum), CAS (California Academy of Sciences), KU (Kyushu University, Fukuoka, Japan).

In older manuals and text books, the family Muscidae has often been divided into Muscidae and Anthomyiidae. Muscids may be defined as cyclor-

[1] This represents, in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 122.

Table 1.—Distributional List of Micronesian Muscidae

	Micronesian Island Groups													Other Localities
					Caroline									
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	Others†	
Anthomyiinae														
1. Fucellia apicalis	X													Japan; China
2. F. boninensis*	X													
3. Anthomyia illocata	X					X							O	Ceylon; Siam; China; Taiwan; Philippines; Hawaii
Coenosiinae														
4. Limosia bimorpha*				X	X	X	X			X				
5. L. townesi*										X				
6. Parvisquama ciliata					X		X	X						Malaya; Buru; New Hebrides
7. P. fulvafacies*										X				
8. P. mariana*				X										
9. P. simplex*									X					
10. P. bifurcata*					X									
11. P. trukensis*								X						
12. Orchisia costata	X		X		X	X	X	X	X					Europe; China; Africa; Madagascar; Taiwan; Samoa; Fiji; Lesser Sunda
13. Pectinaseta prominens				X	X	X	X	X	X	X				Africa; Socotra; Taiwan; Malaya; Samoa; Society Is.
14. Lispocephala beardsleyi*					X									
15. L. dispersa*					X				X	X				
16. Cephalispa gressitti*					X									
17. Pygophora lobata				X	X	X	X	X	X	X	X	X		Malaya; New Guinea; Taiwan; Christmas I.
18. P. boninensis*	X													
19. P. yapensis*						X								
20. P. palauensis*					X									
21. P. edgari*				X										
22. P. alaseta*						X								
23. P. tarsaseta*					X									
24. P. kusaiensis*										X				
25. P. mariana*				X										
26. P. oakleyi*										X				
27. P. minuscula*					X									
28. Atherigona longipalpis				X										
29. A. trukensis*								X						
30. A. excisa	X	X	X	X	X	X	X	X	X	X	X		O,W	Circumtropical

* Described as new.
† M, Marcus I.; N, Nauru I.; O, Ocean I.; W, Wake I.

Table 1.—Distributional List of Micronesian Muscidae—Continued

	Micronesian Island Groups													Other Localities
					Caroline									
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	Others†	
31. A. flavipalpis					×	×	×	×			×		M	Sumatra; Marquesas
32. A. dybasi*					×									
33. A. pottsi*								×						
34. A. tobi*							×							
35. A. oryzae	×	×				×		×	×					India
36. A. sabroskyi*					×									
37. A. boninensis*	×													
38. A. neoatripalpis*					×									
39. A. vita*									×					
40. A. ? laeta					×									
Lispinae														
41. Lispe assimilis	×													Java; Taiwan; Ryukyu Is.; Siam
42. L. incerta					×	×								Australia; India; Samoa; New Hebrides; Bougainville; New Caledonia
43. L. pumiloides*					×	×								
44. L. haha*	×													
45. L. boninensis*	×													
46. L. albifacies					×									Samoa
Fanniinae														
47. Fannia prisca	×													Taiwan; Malaya
48. F. pusio				×									O,W	Southern U.S.A. to Argentina; Hawaii; Samoa
49. F. leucosticta					×									North America; Europe; North Africa; Iran; Yeman; Solomon Is.
Phaoniinae														
50. Ophyra aenescens													O,N	Southern Europe; Southern U.S.A. to Argentina; Galapagos Is.; Marquesas Is.; Tahiti
51. O. nigra				×	×	×		×	×					Russia; China; Japan; Buru; Ryukyu Is.; Bismarck Arch.; Solomon Is.; New Hebrides; Australia
52. O. chalcogaster	×	×	×	×	×	×	×	×	×	×	×			Oriental, Australian and Ethiopian Regions

Table 1.—Distributional List of Micronesian Muscidae—Continued

	Micronesian Island Groups													Other Localities
					Caroline									
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	Others†	
53. Gymnodia tonitrui				X										Africa; China; India
54. G. marguerita*	X													
55. G. expansa*	X													
56. Limnophora haha*	X													
57. L. umbra*	X													
58. L. plumiseta			X	X	X	X	X							Africa; India; Taiwan; Sumatra; Sunda Is.
59. L. bracteola*	X													
60. L. setibunda*	X													
61. L. boninensis*	X													
62. L. dybasi*									X					
63. L. carolina*					X			X	X					
64. L. extincta*				X										
65. Myospila palauensis*					X									
66. Dichaetomyia rota*				X										
67. N. nigroscuta				X										
68. D. sabroskyi*					X									
69. D. rufa				X	X	X	X	X	X	X	X			Australia; New Guinea; Pacific Is.
70. D. apicalis							X	X						Java; Sumatra; Australia; Philippines
71. D. carolina*							X	X						
72. D. mariana*			X	X				X						
73. D. trukensis*								X						
74. D. saperoi				X										
75. D. yapensis*						X								
Stomoxydiinae														
76. Stomoxys calcitrans	X		X	X	X				X					Cosmopolitan
77. Haematobia irritans exigua				X	X	X			X					Australia; India; Philippines; East Indies
78. Bdellolarynx carabao	X			X										
Muscinae														
79. Synthesiomyia nudiseta	X			X										Circumtropical
80. Graphomyia maculata	X													Holarctic; Neotropical; Ethiopian
81. G. stipata rufitibia					X									Taiwan; Java; New Guinea
82. Musca (Musca) domestica	X	X	X	X	X	X	X	X	X	X	X	X	W	Cosmopolitan
83. M. (Biomya) sorbens	X		X	X	X	X	X	X	X	X	X	X	W	Old World Tropics; Australia
84. M. (Emusca) hervei	X				X	X	X							China; India; Ceylon

rhaphous flies which have a seam on the dorsolateral margin of the second antennal segment, lack a row of strong bristles on hypopleura (though short hairs are often present), and lack a well-developed postscutellum.

For convenience of zoogeographers, subfamily names have been used in table 1. Existing muscid subfamily and tribal limits have all been based on faunae from a few geographic regions and often genera from others cannot be

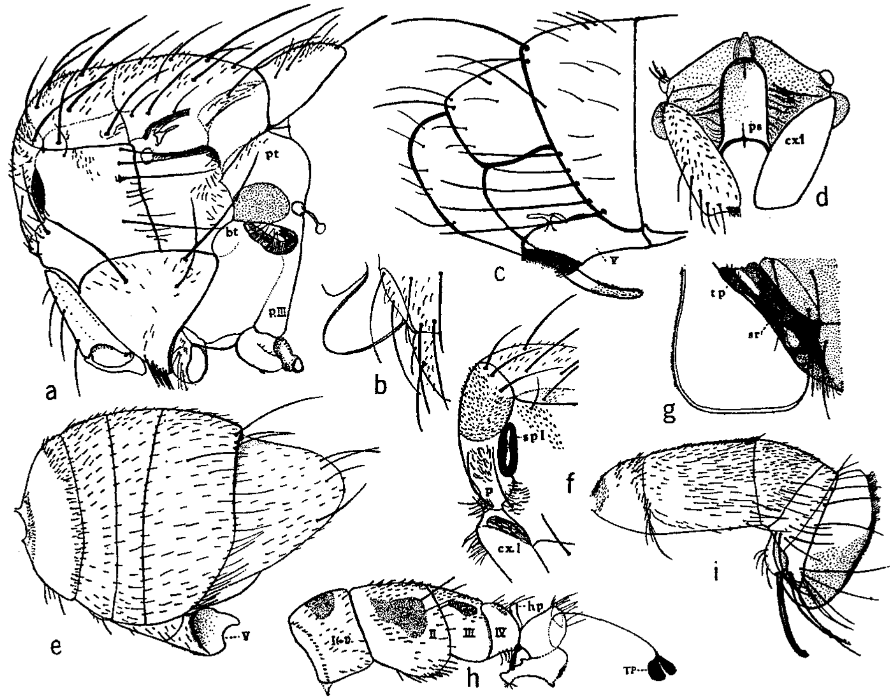


FIGURE 1.—**a, b,** *Dichaetomyia rufa: a,* thorax, lateral view; *b,* dorsal view of lower calyptrae and adjacent parts of thorax. **c,** *Parvisquama ciliata,* apex of male abdomen, lateral view; **d,** *Myospila palau,* prosternum and adjacent parts; **e,** *Cephalispa gressitti,* male abdomen, lateral view; **f,** *Musca domestica,* anterior portion of thoracic pleura; **g,** *Musca hervei,* dorsal view of lower calyptra and adjacent parts; **h,** *Atherigona boninensis,* male abdomen, lateral view; **i,** *Atherigona dybasi,* male abdomen, lateral view. (V, fifth sternite; I to IV, first to fourth visible tergites; pt, pleuratergite below lower calyptra; bt, beret; p III, preepisternum III; cx 1, fore coxae; ps, prosternum; h, humerus; sp 1, anterior thoracic spiracle; p, propleura; tp, tympanic pit; sr, suprasquamal ridge; hp, hypopygial prominence; TP, trifoliate process.)

placed in their proper category. This is particularly true in tropical Phaoniinae and Coenosiinae, and it is possible that, with the discovery of more species from lesser known areas, the two subfamilies may ultimately have to be treated as a single one. Authors are not agreed on the status of *Stomoxys* and its relatives; some consider it to be a tribe of Muscinae, others a distinct sub-

family, and still others as a tribe related to *Limnophora* sensu lato, and therefore part of the Phaoniinae.

The generic keys and descriptions have been simplified because of the limited number of genera present in Micronesia and should not be used for identification of fauna from other areas or regions.

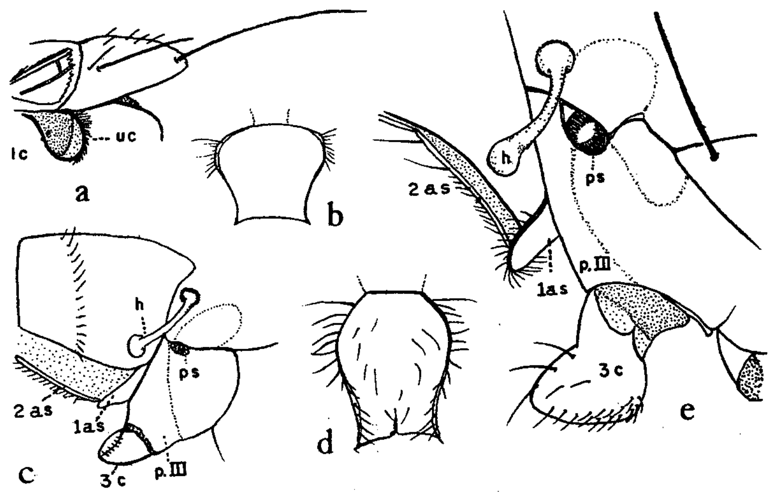


FIGURE 2.—**a,** *Parvisquama ciliata,* lateral view of calyptrae and scutellum; **b,** *Limnophora plumiseta,* prosternum, ventral view; **c,** *L. plumiseta,* base of abdomen and adjacent thoracic parts, lateral view; **d,** *Dichaetomyia saperoi,* prosternum, ventral view; **e,** *Gymnodia tonitrui,* base of abdomen and adjacent thoracic parts, lateral view (h, haltere; 3c, hind coxa; p III, preepisternum III; 1 as, basal or first abdominal sternite; uc, upper calypter; 1c, lower calypter; ps, posterior thoracic spiracle; 2 as, second abdominal sternite).

The following commonly accepted abbreviations for certain bristles, sclerites, and leg surfaces are used in this paper in order to conserve space: *ac,* acrostical bristles; *dc,* dorsocentral bristles; *ia,* postsutural intraalar bristles; *ntpl,* notopleura or notopleural bristles; *st,* sternopleural bristles; *presut,* presutural position; *postsut,* postsutural position; *pra,* anterior postsutural prealar bristle; *a,* anterior; *d,* dorsal; *p,* posterior; *v,* ventral; *ad,* anterodorsal; *pd,* posterodorsal; *av,* anteroventral; *pv,* posteroventral; *F1, F2, F3:* fore, mid, and hind femora; *T1, T2, T3:* fore, mid, and hind tibiae.

Dc 2:4 or 2:3 indicates two pairs of presutural and four or three pairs of postsutural dorsocentral bristles respectively. A similar formula of *ac* 0:1 indicates no presutural acrostical bristles, but a single pair of postsutural ones which are usually prescutellar in position. *St* 1:3, 2:2, or 3:1 indicate one, two, or three pairs of bristles on the anterior portion of the sternopleura and three, two, or one on the posterior portion respectively. Variation in the num-

ber of bristles in either the presutural or postsutural position or the anterior or the posterior part on the sternopleura is indicated by a hyphen between them; thus, *ac* 1-2: 3-5 would indicate one or two pairs of presutural acrostical bristles and three to five postsutural pairs.

Thoracic planes are considered to run anterior to posterior and, unless otherwise noted, are described when the fly is viewed from above and behind. Planes of the leg bristles are usually in a straight line and run from base to apex of the appendage. The legs are assumed to be held in a straight line at right angles to the longitudinal axis of the body and to be approximately octagonal in cross section.

Drawings were prepared with an ocular grid and cross-hatched paper; they are not necessarily drawn to the same scale within the same species or homologous parts of different species.

ZOOGEOGRAPHY

No exclusively endemic genera are present in Micronesia, although *Atherigona dybasi* may represent a new subgenus. *Fucellia, Lispocephala,* and *Myospila* are the only genera whose Micronesian representatives are, as far as is known, confined to single island groups (Bonins and Carolines respectively), although these genera contain species from all geographical regions.

Only three island groups, the Carolines, Bonins and S. Marianas, contain endemic species, these representing 52, 44, and 33 percent respectively of the species present in each group. In the Carolines, Palau has the greatest number of endemics, there being 11, which represent 31 percent of all Palau species. The remaining groups in the Carolines (Yap, Truk, Ponape, and Kusaie) each have two or three species which represent 14 to 18 percent of those present. No endemic species belong exclusively to the Caroline Atolls category.

The fauna of the Bonins appears to have its closest affinities with Japan and China. In these islands, *Limnophora* and its close relative *Gymnodia* have speciated more than in other Micronesian islands or atolls.

Volcano Islands fauna is little known and Iwo Jima is the only one that has had even a limited survey; water is scarce, no land animals except man are present, and most of the vegetation and fauna was destroyed during World War II. The other two islands, Minami-Iwo and Kita-Iwo are very inaccessible and uninhabited; though there is native vegetation, the only water is found in a single spring on Kita-Iwo. One or two more species of *Atherigona* and *Orchisia costata* may possibly occur in the group.

Northern Mariana Islands have only eight species representing five genera. One species is new, but it also occurs in the Southern Marianas. It is probable that further collecting will yield several more species, especially in *Atherigona, Pectinaseta, Pygophora, Dichaetomyia, Haematobia* and *Bdellolarynx.*

Southern Mariana Islands have 24 species, one-third being endemic and all distributed in 15 genera. Guam, the largest island in the group, has probably been more extensively surveyed than any other island in Micronesia and is therefore probably the best known. *Orchisia costata,* and possibly one or two additional species of *Atherigona* may be present, though not before me at this time.

The Caroline Islands have the largest fauna of any group in Micronesia, 22 genera with 56 species; of the 32 new species, 29 are endemic. Palau with its great diversity of environments has the greatest number of genera, species, and endemics of all of the island groups within the Caroline chain.

The Marshall Islands have seven species in five genera; none are new or endemic. More specialized collecting will probably yield additional species in *Atherigona, Dichaetomyia,* and possibly *Pygophora.*

Only three species in *Pygophora* and *Musca* are present in material from the Gilbert Islands. Since *Pygophora* occurs there, species of *Atherigona, Dichaetomyia, Ophyra, Orchisia* and possibly *Pectinaseta* are probably present, especially in the northern atolls.

Ocean, Nauru, Wake, and Marcus undoubtedly have rather limited fauna, but it is probable that the house fly, at least, occurs on all of them and that members of at least *Atherigona* and *Ophyra* will be found. *Ophyra aenescens* is known to occur on no other islands of Micronesia except Ocean and Nauru. Table 2 summarizes the above paragraphs.

Table 2.—Summary of Distribution of Micronesian Muscidae

Island Groups	Genera	Species			
	Total	Total	Old	New	Endemic
Bonin	15	27	15	12	12
Volcano	3	4	4	0	0
N. Mariana	5	8	7	1	0
S. Mariana	15	24	17	7	8
Caroline	22	56	24	32	29
Palau	18	35	20	15	11
Yap	13	22	17	5	3
Atolls	10	12	9	3	0
Truk	9	21	14	7	3
Ponape	12	17	12	5	3
Kusaie	9	13	7	6	2
Marshall	5	7	7	0	0
Gilbert	2	3	3	0	0
Others	4	7	7	0	0
Marcus	1	1	1	0	0
Wake	3	4	4	0	0
Nauru	1	1	1	0	0
Ocean	3	4	4	0	0

None of the metallic Muscinae, such as the common scavengers *Orthellia, Morellia,* and *Pyrellia,* are present in Micronesia although several of them occur in Polynesia, New Guinea, and the Philippines. One might expect to find the seed corn maggot, *Hylemyia cilicrura,* present in the Bonin Islands or possibly Guam.

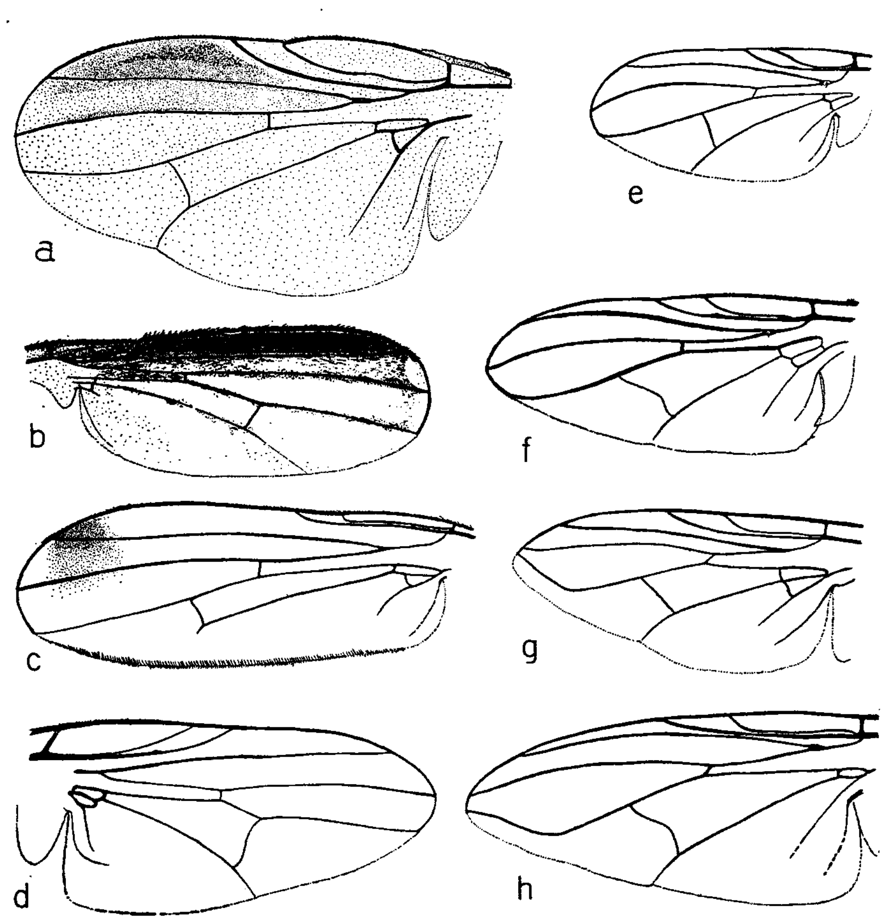


FIGURE 3.—Wings: **a,** *Atherigona trukensis,* male; **b,** *Orchisia costata,* male; **c,** *Pygophora alaseta,* male; **d,** *Fannia prisca*; **e,** *Limnophora plumiseta*; **f,** *Myospila palau*; **g,** *Synthesiomyia nudiseta*; **h,** *Graphomyia stipata rufitibia.*

SYSTEMATICS

Key to Micronesian Genera of Muscidae

1\. Proboscis adapted for blood sucking (fig. 26, *a, b, c*)....................19
Proboscis not adapted for blood sucking, labellae usually fleshy and distinct (fig. 4, *b*, 6, *c*)....................2

2(1). Fourth wing vein strongly curved forward, ending at or before wing tip on anterior margin (fig. 3, *g, h*); lower lobe of calyptrae truncate or transverse apically, its inner margin fused with thorax along most of its length (fig. 1, *g*)....................21
Fourth wing vein slightly (fig. 3, *e, f*) or not at all curved forward, ending well behind wing tip (fig. 3, *a, b*); lower lobe of calyptrae evenly rounded apically and inner margin fused to thorax on less than 0.67 of its inner margin (fig. 1, *b*)....................3

3(2). Seventh wing vein strongly curved forward so as to bisect the short sixth vein if it were extended to wing margin (fig. 3, *d*). Females with a strong submedian, laterally directed, parafrontal bristle on each side (fig. 27, *a*)....................**Fannia**
Seventh wing vein not strongly curved forward but, if extended, would not bisect sixth vein except at or far beyond margin of wing (fig. 3, *a*). Females without a strong submedian, laterally directed parafrontal bristle; median parafrontal bristles, if present, either convergent, reclinate, or proclinate....................4

4(3). Pteropleura hairy or setulose....................17
Pteropleura bare....................5

5(4). Frontal lunule prominent, its dense silvery pruinescence in sharp contrast to the shiny, blue-black juncture of parafacials and parafrontals (fig. 27, *b, g*); halteres black; thorax and abdomen shiny, blue to blue black....................**Ophyra**
Frontal lunule small, inconspicuous and never in sharp contrast to the juncture of parafacials and parafrontals which are usually yellow, gray, or fuscous pruinescent; halteres usually yellow to brown; thorax and abdomen never entirely shiny blue to blue black....................6

6(5). Third wing vein entirely bare....................7
Third wing vein with hairs or setulae either on node (juncture of second and third veins) or beyond on dorsal or ventral, or both surfaces....................17

7(6). Propleura and ventral surface of scutellum bare....................8
Propleura haired in center; ventral surface of scutellum with pale hairs at apex; sixth vein clearly traceable to wing margin....................**Anthomyia**

8(7). Arista bare....................9
Longest aristal hairs as long as or longer than its greatest basal diameter....................12

9(8). Basal abdominal sternite (ventrobasal scale of van Emden) bare (fig. 2, *c*); *St* 3 in an equilateral triangle except in *Atherigona dybasi*....................10
Basal abdominal sternite with an apical fringe of hairs or setulae (fig. 2, *e*); *St* not in form of an equilateral triangle....................11

10(9). In profile antennae inserted at or above dorsal 0.12 of eyes; antennal segment 3 very large, ending at oral margin (fig. 4, *b, c*). *Dc* not differentiated or only posterior two *postsut* pairs slightly distinguishable. *T2* of male and female without a median *a*, but with a median *p*....................**Atherigona**
In profile antennae inserted at or below dorsal 0.33 of eyes; antennal segment 3 not unusually large, and ends at a distance much greater than width above oral margin (fig. 6, *c*). *Dc* **1**:3; *T2* of male without, but female with, a median *a* and *p* bristle....................**Limosia**

11(9). Cheeks not over 0.12 of eye height (fig. 4, *d, e*); front in male very narrow or interrupted, in female broad and without a pair of cruciate interfrontal bristles; *St* 1:1. Sixth wing vein incomplete............**Gymnodia**
Cheeks 0.3 or more of eye height (fig. 4, *a*); front in both sexes 0.3 of greatest head width and with a pair of strong cruciate interfrontal bristles; *St* 2:2; sixth wing vein traceable to wing margin as a faint line or fold............**Fucellia**

12(8). Subbasal scutellar bristles absent or less than 0.5 as long as apicals............13
Subbasal scutellar bristles subequal to apicals............14

13(12). Lower lobe of calyptrae not projecting posteriorly beyond upper one; anterior ocellar bristle longer than posterior reclinate parafrontal bristle; cell between second vein and wing margin not fuscous; *T3* with a *pd* setula on basal 0.25............**Parvisquama**
Lower lobe of calyptrae projecting posteriorly slightly beyond upper one; anterior ocellar bristle shorter and weaker than posterior reclinate parafrontal bristle; cell between second vein and wing margin with an opaque dark-brown cloud which often extends posteriorly beyond second vein (fig. 3, *b*); *T3* without a *pd* setula on basal 0.25............**Orchisia**

14(12). *T1* with a median *p* to *pv* bristle; arista with long hairs confined to basal 0.4 to 0.5 on both surfaces, apical 0.6 to 0.5 entirely bare (fig. 20, *d*)............**Pygophora**
T1 without a median *p* to *pv* bristle; arista with distinct hairs on apical 0.5 or more of one or both surfaces............15

15(14). Anterior ocellar bristles scarcely distinguishable from short adjacent hairs; front at vertex 0.20 of head width; frontal triangle not differentiated anteriorly. *T3* without a strong apical *p* or *pv* bristle............**Cephalispa**
Anterior ocellar bristles strong, at least 0.5 length of posterior reclinate parafrontal bristle; front at vertex 0.25 or more of head width; frontal triangle clearly differentiated, reaching base of antennae; *T3* with a strong apical *p* to *pv* bristle............16

16(15). Median and subbasal *pd* bristles of *T3* strong, subequal; antennae inserted opposite middle of eyes, segment 3 ending distinctly above oral margin (fig. 11, *c*); no sexual dimorphism in length of aristal hairs............**Lispocephala**
Median *pd* bristle on *T3* very short or absent; subbasal *pd* long and prominant; antennae inserted above middle of eyes, and long, slender segment 3 ending at oral margin; male arista with long hairs only on dorsal surface, female arista long-haired on both surfaces (fig. 20, *b, c*)............**Pectinaseta**

17(4). Prosternum bare; palpi slightly to broadly dilated apically; frons broad in both sexes............**Lispe**
Prosternum with lateral hairs; palpi slender; male frons constricted and narrow except in *D. rota*; broad in females............**Dichaetomyia**

18(6). Longest aristal hairs on both surfaces equal to length of yellow antennal segment 3; apex of palpi yellow; beret and hypopleura below spiracle hairy............**Myospila**
Longest aristal hairs on both surfaces never longer than width of black to fuscous antennal segment 3; palpi entirely fuscous; beret and hypopleura below spiracle bare except in *L. setibunda*............**Limnophora**

19(1). Palpi at least 0.80 as long as proboscis............20
Palpi less than 0.33 as long as proboscis (fig. 26, *b*)............**Stomoxys**

20(19). Arista bare on ventral surface (fig. 26, *a*)............**Haematobia**
Arista with several hairs on ventral surface (fig. 26, *c*)............**Bdellolarynx**

21(2). Pteropleura bare............22
Pteropleura hairy or setulose............**Musca** Linnaeus (s. lat.) 23

22(21). Arista and beret bare; palpi entirely, and antennae mostly, red to fulvous .... **Syntheriomyia**
Arista and beret long-haired; antennae and palpi mostly or entirely black to fuscous .... **Graphomyia**

23(21). Propleura setulose (fig. 1, *f*) .... **Musca** Linnaeus (s. str.)
Propleura bare 24

24(23). Anterior portion of suprasquamal ridge setulose .... **Eumusca**
Anterior portion of suprasquamal ridge bare .... **Biomya**

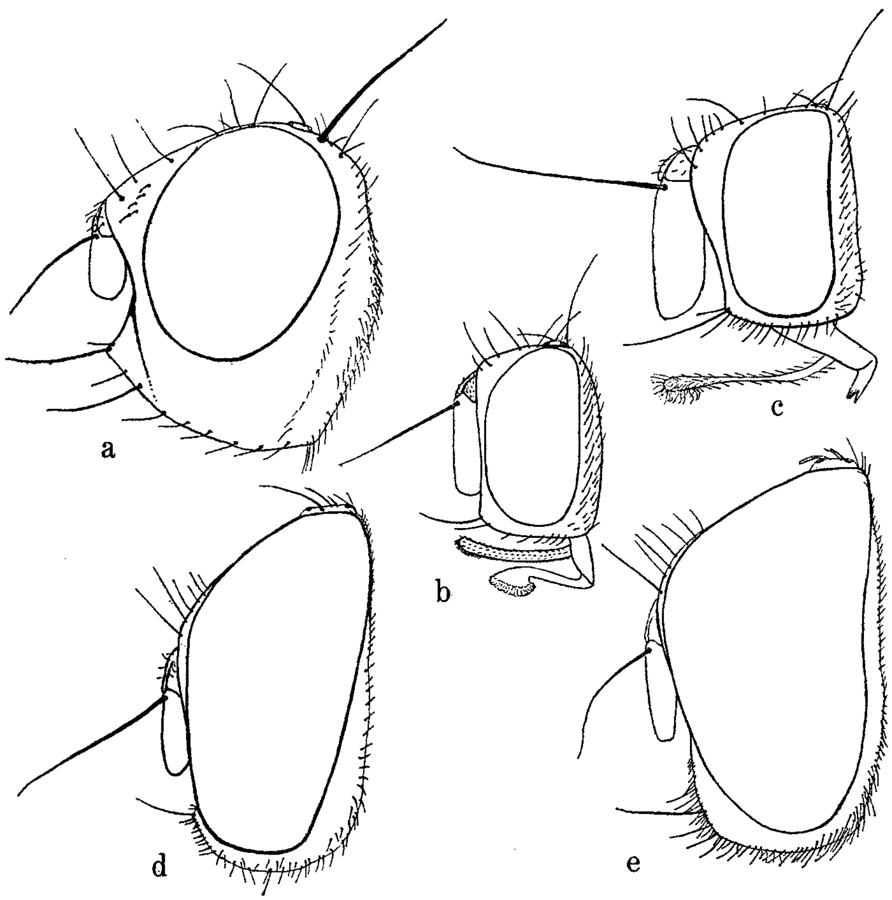


FIGURE 4.—Head profiles, males: **a,** *Fucellia boninensis*; **b,** *Atherigona excisa*; **c,** *A. longipalpis*; **d,** *Gymnodia marguerita*; **e,** *G. expansa.*

Genus **Fucellia** Robineau-Desvoidy

Halithea Haliday, 1838, Ann. Mag. Nat. Hist., I, **2**: 185 (preoccupied by *Halithea* Savigny 1817).

Fucellia Robineau-Desvoidy, 1841, Soc. Ent. France, Ann. **10**: 269.—Stein,

1910, Stett. Ent. Zeitung **29**: 12.—Aldrich, 1918, Calif. Acad. Sci., Proc. IV, **8**: 157.—Malloch, 1934, Diptera of Patagonia and South Chile, **7** (2) Muscidae: 195.

Type species: *F. maritima* Haliday.

Front broader than width of one eye in both sexes, and with a pair of cruciate bristles near middle of frontal vitta; three pairs of prominent posterior parafrontal bristles which are generally outwardly directed, but anterior pair are more forwardly, middle pair laterally, and posterior pair more backwardly directed. Palpi slender. Arista bare. *Dc* 2: 3; humeri with an outwardly directed, short to moderate bristle at middle of lateral surface. Propleura, prosternum, hypopleura, and pteropleura bare. Scutellum without short appressed clothing setulae on disc, but with a pair of short discal bristles and an apical and a basal pair of marginal bristles between which is a row of short setulose hairs on the upper declivities; ventral surface bare.

Costa usually with a few setulae on dorsal or posterior surface beyond apex of first vein which are slightly to very distinctly longer than adjacent clothing hairs: other veins bare. Sixth vein is clearly traceable to margin. Lower calyptrae very much smaller than upper ones.

Key to Micronesian Species of Fucellia

Males: Wings with a large round brown spot near tip; apices of processes of abdominal sternite 5 with several long hairs. Females: Palpi dark, only slightly brownish near base; *T1* usually with only one submedian *p* bristle........**1. apicalis**

Males: Wings unspotted; apices of processes of sternite 5 with short hairs only. Females: Palpi entirely fulvous; *T1* usually with two *p* bristles..........**2. boninensis**

1. **Fucellia apicalis** Kertesz.

Fucellia apicalis Kertesz, 1908, Wiener Ent. Zeitung **27**: 71.—Stein, 1910, Stett. Ent. Zeitung **29**: 26.

Male: Head fuscous; front pale brown pruinescent, vitta sometimes reddish at base of antennae and parafrontals with grayish reflections posteriorly; face and cheeks dark seal brown, to blackish brown pruinescent; back of head gray pruinescent. Frons parallel-sided, wider than greatest width (in frontal view) of one eye. Three pairs of convergent parafrontals anteriorly and with usual three pairs of posterior bristles; a few short hairs lateral to anterior parafrontals; cheeks about 0.33 of eye height and with a row of almost uniform bristles along ventral margin; vibrissae strong. Antennae black, rather short; inserted opposite middle of eyes, terminating well above their lower margin; segment 3 twice as long as 2. Palpi dark, their bases brown to fulvous. Eyes bare.

Thorax fuscous, gray pruinescent; unmarked or with only very indistinct traces of a yellowish-gray median vitta. With three pairs of *presut ac* setulae, and without intervening hairs; *dc* 2: 3; *ntpl* without adjacent adventituous hairs; mesopleura without an anterior bristle below anterior *ntpl*; *st* 2: 2, lower ones shorter than upper ones; *pra* about 0.5 as long as posterior *ntpl*. Hypopleura bare.

Legs fuscous, tibiae fulvous, except a variable apical portion of *T1* and *T3* which are variably darkened; trochanters shiny brownish fulvous. *F1* with a row of *pd* and *pv* bristles. *T1* with a median *ad* and *pd*; apical *d* and *pv* longer than *T1* diameter; apical *p* short. *F2* with a row of short subdorsal *a* bristles; *av* and *pv* surfaces without distinct bristles but some of the clothing hairs on *v* surfaces about 0.25-0.50 as long as height of *F2* where situated. *T2* with a long *ad* and *pd* slightly beyond middle and usually two short *p* on median 0.5 to 0.7; without any *av* except strong apical one. *F3* with a few *av* bristles on apical 0.3 to 0.6 and a single very short preapical *pv*; with two *d* and *pd* on apical 0.15,

and a complete row of *ad*. *T3* with three to five *ad* and *pd* as well as four to seven very short *av*. Tarsi not unusually modified.

Wings with a very large, dark-brown, apical spot from costa to fourth vein which extends basally almost to opposite posterior cross vein; remainder hyaline. Costal thorns terminate beyond apex of first vein but are not strongly differentiated from costal hairs except on ventral surface. Calyptrae white; halteres yellow.

Abdomen dark, fuscous gray pruinescent, with an indistinct dark median vitta and basal checkerings. Basal sternite bare. Length: 4.0-5.5 mm.

Female: Similar to male, but head brownish gray pruinescent; the face not seal brown but with a dark streak on parafacials opposite base of antennal segment 3.

Thorax with a brownish median vitta and faint indications of denser, brown pruinescence between *dc* and *ia* planes.

Wings without dark apical spot as in male. Leg bristles somewhat stronger than in male, especially *av* on *T3*; and with one or two median *av* on *T2*. Length: 5-6 mm.

DISTRIBUTION: China, Japan, Bonin Is.

BONIN IS. CHICHI JIMA: Male, Omura, "Camp Beach," Apr. 1958, Snyder.

A series from Kyushu, Fukuoka, Camp Hakata, Japan, Apr. 1955, Arnaud, in my collection was taken in a light trap. The single male from Micronesia was taken in the same environment as the following species.

2. **Fucellia boninensis** Snyder, new species (figs. 4, *a*; 5, *a-c*).

Male: 3.9-5.1 mm. long. Head dark; pruinescence on face and cheeks brownish gray, and on occiput gray. Front reddish to fulvous at base of antennae, blending to brownish gray posteriorly; parafrontals more brownish gray. Parafacials with a dark streak opposite juncture of antennal segments 2 and 3 (fig. 4, *a*). Front at vertex 0.42-0.45 of head width, almost parallel-sided; bristled as in *apicalis*. Cheeks 0.35 to 0.40 of eye height. Antennae black. Palpi fulvous.

Thorax fuscous, gray pruinescent; an indistinct median brown vitta and often a small brownish mesopleural shadow. With three pairs of short *ac* bristles and without interspersed *ac* hairs. *Pra* about 0.5 as long as posterior *ntpl*, and without interspersed adventitious *ntpl* hairs.

Legs fuscous, femora gray pruinescent, trochanters shiny brown, tibiae fulvous and frequently apices or more of fore or hind pairs or both dark brown to fuscous; usually with sparse gray pruinescence; *T2* usually entirely fulvous. *F1* normal. *T1* with a median *d* to *ad*, and one or two short *p* bristles. *F2* with a row of short subdorsal *a* bristles, two strong preapical *p*, and a few slender *v* on basal 0.3 to 0.5. *T2* with a strong submedian *ad*, a shorter *pd*, and usually a very short *p*. *F3* with some *av* on apical 0.5 which become longer apically, one to three slender, longish apical *pv*, and one or two of the basal *v* hairs often longer than adjacent clothing setulae. *T3* with two *pd*, four to six *ad*, and several shorter *av*. Tarsi normal.

Wings hyaline, unspotted, otherwise as in *apicalis*. Calyptrae white; halteres yellow.

Abdomen fuscous gray pruinescent; with dorsal checkerings and an indistinct dark median vitta. Basal sternite usually with a few hairs, the fifth fulvous, shaped as in figure 5, *c*. Hypopygium not unusually enlarged (fig. 5, *a*, *b*).

Female: 4.5-5.5 mm. long. Similar to male but face and cheeks often lighter brown to fulvous. Thorax with median vitta more distinct, and with traces of a vitta between *dc* and *ia* planes.

F2 without and *T2* frequently with a very short submedian; *a* to *av* bristles stronger.

Holotype, male (US 67158), allotype, female (US), 32 male, 12 female paratypes (BISHOP, US), Bonin Is., Chichi Jima, Omura, "Camp Beach," Apr. 2-25, 1958, Snyder.

DISTRIBUTION: Bonin Islands (Chichi Jima).

All specimens were taken on a sandy beach a few yards above the sea. They were seen only an hour or two after sunrise, or before sunset, resting on sand, fish scales, and small twigs of driftwood. During May and early June none were found, though the same area was carefully investigated at the same times of day as well as earlier and later.

This species appears to be very closely allied to the western North American *aestuum* Aldrich (1918, Calif. Acad. Sci., Proc. IV, **8**: 118), but that species has all tibiae, as well as the basal two-fifths of palpi, darkened.

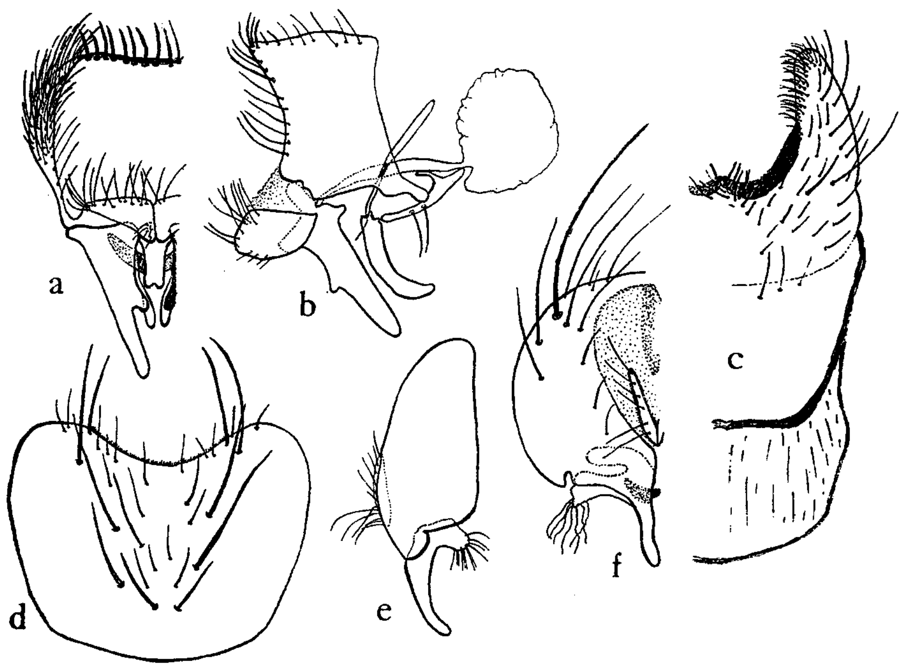


FIGURE 5.—**a-c**, *Fucellia boninensis: a,* male copulatory appendages, ventral view; *b,* same, lateral view; *c,* male fifth abdominal sternite, ventral view. **d-f**, *Fannia prisca: d,* male fifth abdominal sternite, ventral view; *e,* male copulatory appendages, lateral view; *f,* same, ventral view.

Genus **Anthomyia** Meigen

Meigen, 1803, Illiger's Mag. **2**: 281.—Bezzi and Stein, 1907, Kat. Paläarkt. Dipt. **3**: 727.—Malloch, 1924, Ann. Mag. Nat. Hist. IX, **14**: 267.—van Emden, 1941, Bull. Ent. Research **32**: 260.

Type species: *A. pluvialis* Linnaeus.

Propleura haired; sixth wing vein reaching wing margin. Ventral surface of scutellum with soft hairs at apex; basal segment of hind basitarsus with a distinct basal

ventral spine. Thorax with dense gray pruinescence, and with a transverse *postsut* brown to black band. *St.* 2:2, posterior two closely placed and lower posterior one usually stronger than weak lower anterior one. *F3* with several strong preapical *d* and *pd* bristles. Front in male constricted; broad in female and with a pair of cruciate interfrontal bristles.

3. **Anthomyia illocata** Walker.

Anthomyia illocata Walker, 1856, Linn. Soc. London, Proc. **1**: 129.—Malloch, 1924, Ann. Mag. Nat. Hist. IX, **14**: 268, 271.—Karl, 1935, Arb. Morph. Tax. Ent. Berlin-Dahlem **2** (1): 47.

Anthomyia bisetosa Thomson, 1868, Kongl. Sven. Freg. Eugenies Resa, Diptera, 555.

Anthomyia vicaricans Schiner, 1868, Reise Novara, Dipt., 298.—Malloch, 1924, op. cit., 271, 274.

Male: Head fuscous, gray pruinescent. Parafrontals bear two pairs of short bristles anteriorly and often a few short hairs posteriorly, and are usually broadly contiguous. Eyes separated at narrowest part of front by scarcely more than diameter of anterior ocellus. Palpi and antennae fuscous, longest aristal hairs at least as long as greatest diameter of gradually tapering arista.

Thorax black, with dense gray pruinescence; a transverse, deep black to brown band extends posteriorly from transverse suture to second *postsut dc* bristle; another black band across a variable basal area of scutellum; sometimes with a very limited brownish spot at base of anterior *presut dc* bristle.

Legs black. Wings hyaline. Calyptrae white; halteres yellow.

Abdomen fuscous; a variable portion of segment 1 and sometimes base of 2 fulvous in ground color, all with dense gray pruinescence; base of first visible tergite (actual first) usually dark, remainder (actual second) without dark marks; second to fourth visible ones with a black basal band which is expanded posteriorly to form a dark midline, and two small lateral triangular spots. Narrow fifth (prebasal hypopygial) segment shiny black.

Female: Similar to male, eyes separated at vertex by a distance equal to length of antennal segment 3 and at base of antennae by a distance equal to combined lengths of segments 2 and 3. Frontal triangle expansive, gray pruinescent and ending at or slightly anterior to pair of cruciate interfrontal bristles. Remainder of frontal vitta velvety black to fulvous brown.

Length 3.5 to 5.2 mm.

DISTRIBUTION: Ceylon, Siam, China, Taiwan, Philippines, Hawaii, Bonin Is., Caroline Is., Ocean I.

BONIN IS. 46. CHICHI JIMA: Omura, Chihiro-iwa, Tatsumi Wan. HAHA JIMA: Okimura. All Apr.-June 1958, Snyder.

YAP. YAP: One, Kolonia, June 1957, Sabrosky.

OCEAN I.: Three, Banaba, Dec. 1957, Krauss.

This species is very closely allied to the West African *fasciata* Walker and they may eventually prove to be only subspecies of a single widely distributed species.

On the Bonin Islands, males were most commonly taken early in the morning on tree trunks of small *Hibiscus* spp. This arboreal habit is similar in the type species and several other species of the genus.

Genus **Limosia** Robineau-Desvoidy

Limosia Robineau-Desvoidy, 1830, Acad. Roy. Soc. Sci. France, Mem. **2**: 561.
Palusia Robineau-Desvoidy, 1830, ibid., 583.
Eriostyla Lioy, 1864, Atti Inst. Veneto, III, **9**: 997.
Coenosia (of authors, not Meigen) Rondani, 1866, Della Soc. Ital. Scienz Natur. **9**: 76.—van Emden, 1940, Ruwenzori Exped. 2 (4), Muscidae B: 145.
Centriocera Pokorny, 1893, Zool.-bot. Ges. Wien, Verhandl. **43**: 537.
Macrocoenosia Malloch, 1920, Am. Ent. Soc., Trans. **46**: 162.
Coenosia (*Limosia*) Huckett, 1934, Am. Ent. Soc., Trans. **60**: 133.
Austrocoenosia Malloch, 1934, Diptera of Patagonia and South Chile **7** (2): 217.
Coenosia (*Coenosia*) Hennig, 1952, Beitr. zur Ent. **2**: 61.

Type species: *L. campestris* Robineau-Desvoidy.

Front in both sexes 0.3 or more of head width, almost parallel-sided; with a single pair of reclinate posterior parafrontal bristles.* Inner verticals strong, somewhat reclinate. Arista bare. Antennal segment 3 not unusually long or conspicuous. *Dc* 1:3; *st 3,* in an equilateral triangle; prosternum, pteropleura, propleura, and all parts of hypopleura bare. *F3* with only two apical or preapical bristles on dorsal surfaces; *T3* without distinct *ad* or *pd* bristles on basal 0.25 or less. Costa continued to apex of fourth vein; all veins except costa bare; sixth and seventh veins very short. Lower lobe of calyptrae extends posteriorly distinctly beyond upper one.

The two Micronesian species agree best with the classification proposed by Huckett for the Nearctic fauna and by van Emden for Ethiopian species. The two different names which these authors accept for this segregate involve a question of nomenclature, discussion of which is out of place in this report; its final settlement will probably be resolved only through a decision of the International Congress of Zoological Nomenclature.

Key to Micronesian Species of Limosia

Male without, female with a median anterodorsal bristle on *T3*; both sexes with two pairs of postsutural intraalar bristles .... **4. bimorpha**
Male with a median anterodorsal bristle on *T3,* and a single pair of postsutural *ia* bristles; female unknown .... **5. townesi**

4. **Limosia bimorpha** Snyder, new species (fig. 6).

Male: 1.8-2.2 mm. long. Head viewed from in front with frontofacial stripe and cheeks uniformly and densely silvery white pruinescent, but when tipped so that face is seen somewhat from below and in front, then with a conspicuous fuscous area from base of antennae to middle of face. Frontal vitta viewed from above and behind yellow except for a U-shaped dark area; grayish pruinescent from occiput to opposite level of median parafrontal bristles. Occiput gray pruinescent. Front at middle 0.45 of head

* The inner vertical bristles are not to be confused as a second pair of posterior reclinate parafrontal bristles.

width and at base of antennae 0.40. With an anterior and median pair of convergent parafrontal bristles, subequal to reclinate parafrontals and anterior ocellars. Post-ocellars divergent and somewhat weaker than anterior ocellars; the outer verticals very weak and scarcely differentiated from the single irregular row of postoccular setulae. Parafrontals, parafacials and their juncture not conspicuously projecting in profile. Cheeks almost as high as width of antennal segment 3 (fig. 6, *c*). Antennal segment 3 pale to fulvous yellow, sparsely to distinctly whitish pruinescent, depending

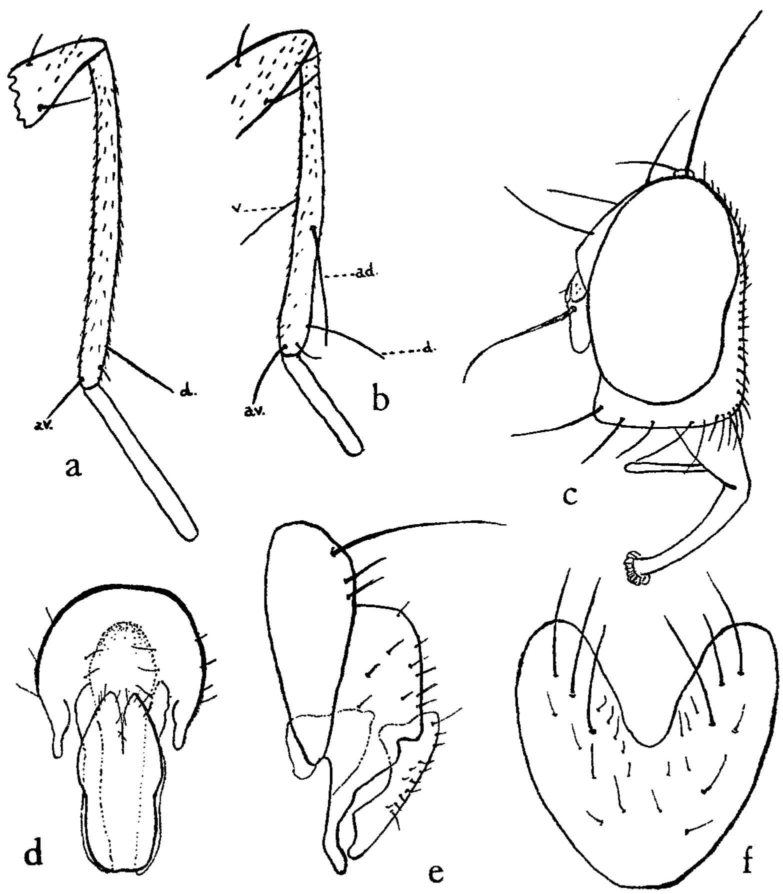


FIGURE 6.—*Limosia bimorpha:* **a**, male *T3*, anterior view; **b**, female *T3*, anterior view; **c**, female head profile; **d**, male copulatory appendages, ventral view; **e**, same, lateral view; **f**, male fifth abdominal sternite, ventral view.

on angle at which viewed; segment 2 darker. Antennae inserted about opposite middle of eyes and ending distinctly above oral margin. Segment 3 is 1.8 to 2.0 times as long as 2. Arista bare, pale brown. Eyes bare, in profile narrower below than above but not emarginate. Palpi narrow; yellowish to white; without distinctive bristles or hairs.

Thorax fuscous, bluish gray to gray pruinescent; not vittate, or at most with a narrow dark line in each *dc* plane; *ac* setulae in two irregular rows; prescutellar not strongly differentiated, without accessory anterior *presut dc* setae; *ia* 2, anterior one

very short; apical pair of scutellars as long as basolaterals; posterior *st* much stronger than others.

Legs entirely yellow except hind tarsi which appear brownish in certain angles; mid and hind coxae partly or entirely gray pruinescent. *F1:* a row of four to six *pv* bristles and a basal *p*, other surfaces without bristle. *T1* without bristles except a very short, scarcely differentiated apical *d* which is subequal to *T1* diameter. *F2:* two submedian *a*, one basal and one preapical *p* setula and two *v* on basal 0.5; all *F2* setae short. *T2* without median bristles, apical *v* quite long, and is the only differentiated apical bristle. *F3:* three to five widely spaced *ad* and *av* bristles on basal 0.8; a single median *v* to *pv*; apical or preapical *d* bristle clearly defined, without a preapical or apical *pd* or *p*. *T3* as in figure 6, *a*. All tarsi normal, claws and pulvilli small but distinct.

Wings hyaline, veins yellow to brownish yellow. Costa gradually tapering apically and ending at fourth vein, with inconspicuous hairs and setulae. Halteres yellow; calyptrae whitish hyaline. Posterior cross vein not curved; anal angle of wing evenly rounded.

Abdomen mostly dark, but with a variable yellow basal area; and often with a narrow apical yellow band on segments 3 and 4; pruinescence gray but with an elongate brown spot on each side of midline of all tergites. Basal hypopygial segment mostly concealed, but sometimes with a pair of small, round, dark, dorsal spots. Ventral portions of tergites more extensively yellow than dorsum or sides. Basal sternite bare. Sternite 5 and hypopygium inconspicuous (fig. 6, *d-f*).

Female: 2.3-2.5 mm. long. In frontal view, frontofacial stripe sparsely gray pruinescent and not obscuring yellow to fulvous anterior portion of front; fuscous subquadrate area on face extends to apex of antennae. Front at base of antennae not quite so constricted as in male, but similarly bristled. Antennae fuscous, apex of segment 2 with a conspicuous gray pruinescent area; dorsal apex of segment 3 with a small angular extension.

Thorax as in male.

Legs colored as in male. *F1:* a row of *ad* and *pd* bristles and two or three short *d* at apical 0.33. *T1:* a long median *p*; a short apical *d, pd,* and *pv* setae, the *pd* shortest and not so long as *T1* diameter. *F2:* two short *ad* and *av* on basal 0.33, a stronger submedian *a*, and *v* bristle, and a preapical *p*. *T2:* a submedian *a* to *ad*, and a *p* bristle; apical *a, pv* and *av* become longer and stronger in order named, and longer than *T2* diameter. *F3* as in male, but bristles somewhat stronger and the single apical to preapical is more *pd* situated. *T3* as in figure 6, *b*.

Wings as in male.

Abdomen mostly fuscous, sparsely pruinescent; with limited, light fulvous areas on dorsum of tergites 1 and 2; and faint indications of paired brown spots confined only to tergites 3 and 4.

Holotype, male (US 67159), allotype, female (US), Fassarai I., Ulithi, July 10, 1946, Townes. Paratypes (BISHOP, US), seven males, four females, same data as holotype.

The following are not paratypes:

S. MARIANA IS. GUAM: Two, Pago Bay, June 1945, Dybas; one, Fadian, Aug. 1936, Swezey; Cocos I., Oct. 1957, Krauss.

PALAU. BABELTHUAP: 10, Ulimang, Ngaiangl, Melekeiok, Ngerehelong, May, Dec. 1947, 1952, 1957, Dybas, Beardsley, Sabrosky. ANGAUR: One, Feb. 1948, Dybas. PELELIU: One, northeast part, July 1945, Dybas. NGAIANGL: Two, Dec. 1952, Beardsley; four, May 1957, Sabrosky.

YAP. YAP: Three, Kolonia, Giliman, May, July, Aug. 1950, 1957, Goss, Sabrosky. E. MAP: Three, July-Aug. 1950, Goss. RUMUNG: One, June 1957, Sabrosky.

CAROLINE ATOLLS. PULO ANNA: Three, Sept. 1952, Krauss. NGULU: Four, Oct. 1952, Krauss. ULITHI: Three, Fassarai, Oct. 1952, Krauss; July 1946, Townes. WOLEAI: Five, Utagal, Sept. 1952, Krauss; Falalis, Sept. 1952, Krauss; Woleai, Feb. 1953, Beardsley. IFALIK: Three, Ifalik, Feb. 1953, Beardsley, Sept. 1953, Bates. SATAWAL: Six, Satawal, Sept. 1952, Krauss, Feb. 1953, Beardsley. LAMOTREK: One, Lamotrek, Feb. 1953, Beardsley. NOMWIN: Three, Fananu, Feb. 1954, Beardsley.

TRUK. PIS: One, June 1946, Townes.

KUSAIE. One, Mt. Fenkol, 300 m., Jan. 1953, Gressitt.

DISTRIBUTION: S. Mariana Is. (Guam), Caroline Is. (Palau, Yap, Truk, Caroline Atolls, Kusaie).

Labels on specimens indicate they were taken at lights, sweeping, and on "*Pemphis*."

These small flies are quite fragile and easily discolored unless especial care is taken to separate them from large, hard-bodied insects when being killed. Only the type series and a few others can be considered to be in good condition.

One of the females (Map I.) has two closely placed median *a* bristles on *T2* on the one leg still on the specimen. I suspect this individual is either a mutant or a specimen in which the anlage of the bristles was injured during development.

Few species of *Limosia* exhibit sexual differences in leg bristling. Because there are abundant specimens of both sexes from the various localities where males lack the *ad* on *T3* and females possess one, it seems probable that a single species is represented. Such dimorphism occurs in certain Neotropical species of related coenosiine genera, and considerably greater sex differences also occur in certain western United States *Limosia* species. The presence or absence of a median *ad* bristle on *T3* has been used as a generic character by several authors in related genera.

5. Limosia townesi Snyder, new species.

Male: 1.9 mm. long. Head similar to preceding species, but lacks the conspicuous fuscous facial mark beneath antennae; antennal segment 2 yellow, concolorous with 3.

Humeri with limited yellow areas; *ac* setulae short, sparse and in a single irregular row; *ia* 1. Otherwise colored and bristled as in *bimorpha.*

Legs yellow. *F1* and *T1* without conspicuous bristles and only apical *d* setula on *T1* longer than normal clothing setulae. *F2:* a basal and median *a,* an apical *p* and a submedian *v* bristle; *T2* as in *bimorpha. F3:* a complete row of four or five widely spaced *ad* and two submedian *av* bristles; the two apicals situated opposite each other on *ad* and *pd* surfaces. *T3:* a long median *ad,* and a shorter apical *d* and *av* bristle.

Wings, calyptrae, and halteres as in *bimorpha.*

Abdomen entirely yellow, unmarked.

Holotype, male (US 67160), Kusaie I., "TahongaRu," Aug. 19, 1946, Townes.

DISTRIBUTION: Caroline Is. (Kusaie).

The abdomen of this somewhat teneral specimen was inadvertently broken

off while I was examining certain sternal characters. It is glued to the card point with the remainder of the specimen.

If primary consideration is given to geographical distribution in limiting species, the female specimen of *bimorpha* from Kusaie may possibly be the female of the male described above. Since this female is badly greased and discolored but still possesses two pairs of *postsut ia* bristles, I hesitate to associate it with the above male. More extensive collecting will be necessary in the eastern Caroline Islands before the final status of various forms or subspecies can be established, on the basis of extent of yellow color of the male abdomen.

Genus **Parvisquama** Malloch

Lispocephala (*Parvisquama*) Malloch, 1935, Federated Malay States Mus., Jour. **17**: 662.

Type species: *P. pahangensis* Malloch.

Front at vertex 0.6 maximum width of one eye in both sexes; gradually widened to base of antennae. Frontal triangle narrow, complete. Four pairs of parafrontal bristles, anterior two pairs convergent and posterior two pairs reclinate; ocellar bristles small but distinct. Arista short plumose to tip, longest hairs on both surfaces including aristal diameter almost, or quite as long as width of antennal segment 3.

Dc 1 : 3; *ia* 2; *st* in an equilateral triangle; basal scutellar bristles less than 0.5 the length of apicals. Wings unmarked. Lower calyptrae not as large as upper ones.

T1 without a median *p*. *T2* with only a *p* near middle. *T3* with two *ad* and *pd* bristles, subbasal ones in each series shorter than submedian ones; with an *av* beyond middle.

Males with a fringe of long hairs at apex of fourth visible tergite, longest hairs extend to opposite base of long superior forceps. Basal hypopygial process long, cylindrical, and subequal in length to tergite 4. Processes of sternite 5 with a distinct appendage arising on inner surface.

It should be emphasized that though the above characters apply only to Micronesian species, they also hold true for the two species from Fiji discussed by van Emden (1942, Ann. Mag. Nat. Hist. XI, **9**: 97-98).

The members of the group are very similar and it has been practically impossible to separate females with any degree of accuracy. Only *ciliata* Malloch and *fulvafacies* are represented by a good series of specimens; the descriptions of the remaining species had to be based on teneral or poorly preserved individuals.

Since the configuration of the male fifth sternite processes appears constant in the limited material from several widely separated island groups within Micronesia, I have treated it as representing several distinct species. It is possible that more mature and properly preserved specimens will indicate that either fewer species are involved, or that more obvious characters in both sexes exist if they become available for study.

Parvisquama was originally proposed as a subgenus of *Lispocephala,* but the configuration of the fifth sternite and the presence of appendages coupled with reduced size of the lower calyptrae and the shortened basal scutellar

bristles are, in my opinion, sufficient to warrant it being treated as a distinct genus.

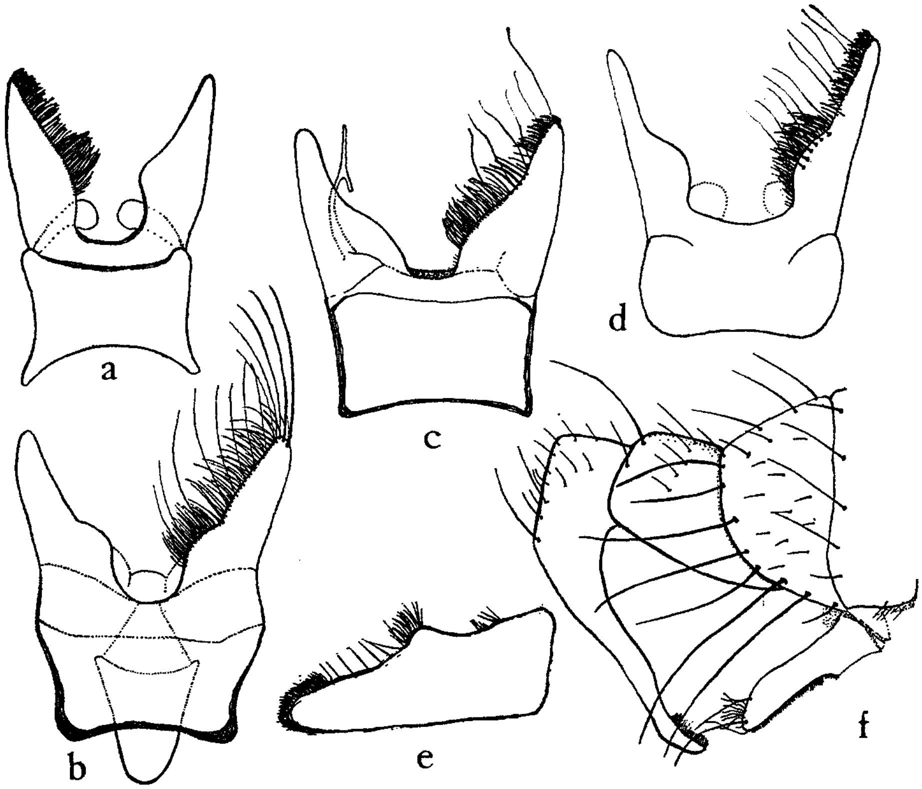


FIGURE 7.—a-e, *Parvisquama* spp., male fifth abdominal sternite, ventral view: *a, P. ciliata*; *b, P. bifurcata*; *c, P. trukensis*; *d, P. mariana*; *e, P. simplex,* ventrolateral view. f, *P. fulvafacies,* male apex of abdomen, lateral view.

KEY TO MALES OF MICRONESIAN SPECIES OF PARVISQUAMA

1. Sternite 5 of male with an almost uniform fringe of closely placed, short black hairs along entire inner margin of processes (figs. 1, *c*; 7, *a, b*); *F2* usually without a preapical *pv* seta more stoutly developed than other hairs in the *pv* series in both sexes (fig. 10, *b*) .... **6. ciliata**
   Sternite 5 of male not so armed; *F2* usually with a distinct preapical *pv* seta opposite preapical *p*, longer than adjacent *pv* hairs in both sexes (fig. 10, *d*) 2

2(1). Apex of each process with long terminal hairs (figs. 7, *b, f*; 9, *g, h*) 3
   Apex of each process without long terminal hairs (or if preapical hairs are present, they are distinctly basad to tip) (fig. 7, *c, d*) 4

3(2). Appendage of sternite 5 simple, not bifurcate (fig. 9, *g*)..................**7. fulvafacies**
Appendage of sternite 5 bifurcate (fig. 8, *b*)..**10. bifurcata**
4(2). Appendage of sternite 5 simple, not bifurcate; processes as in figure 9, *i*)....
....**9. simplex**
Appendage of sternite 5 bifurcate...5
5(4). Processes as in figure 9, *b*..**11. trukensis**
Processes as in figure 9, *d*...**8. mariana**

6. Parvisquama ciliata (Malloch). (Figures 1, *c*; 2, *a*; 7, *a*; 8, *c*; 9, *e, f*; 10, *a, b*; 20, *f*.)

Lispocephala ciliata Malloch, 1929, Treubia **7** (4) : 393.

Lispocephala (*Parvisquama*) *inaequalis* Malloch, 1935, Federated Malay States Mus., Jour. **17** : 665.

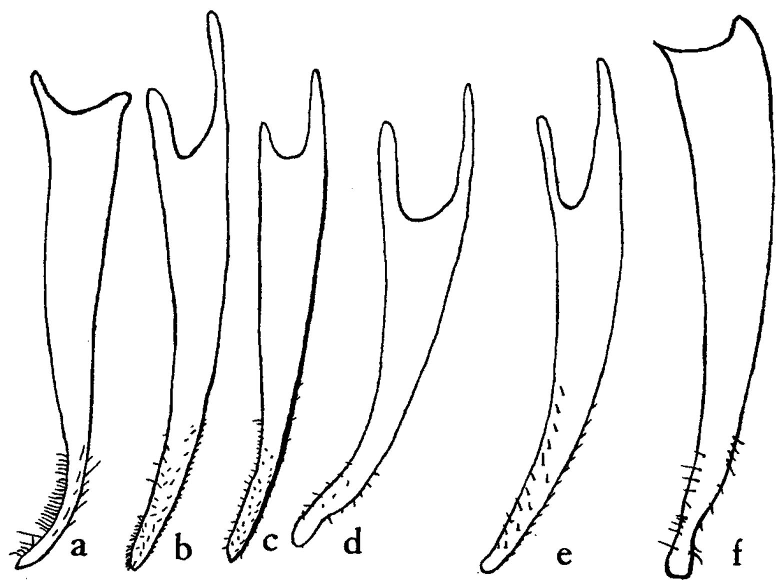


FIGURE 8.—Outer (ectal) surface of left male superior forceps: **a,** *Parvisquama fulvafacies*; **b,** *P. bifurcata*; **c,** *P. ciliata*; **d,** *P. trukensis*; **e,** *P. mariana*; **f,** *P. simplex.*

Head dark, gray pruinescent. Frontal vitta velvety reddish brown to fuscous and divided by the complete, narrow, gray frontal triangle. Antennal segment 2 fuscous, 3 yellow to fulvous and usually with dark apical shadows. In profile as in figure 20, *f*. Palpi light brown to fuscous, never yellow or fulvous.

Thorax fuscous, gray pruinescent; with two indistinct brown vittae in *dc* plane; *ac* hairs short, in one or two irregular rows.

Legs yellow; base of mid and hind coxae sometimes with a dark basal streak, tarsal segment 4 usually light brownish. *F1* with three or four of the basal *av* bristles more strongly developed than others in males; very short or scarcely differentiated in females; both sexes with usual *pd* and *pv* row of bristles. *F2* with three to five short *a* bristles on median 0.4 to 0.6; one or two long *v* basally; a short but distinct preapical

a and *p* setula; *av* and *pv* clothing hairs short and appressed, subequal on both surfaces; and with two to four long *v* bristles on basal 0.3 (fig. 10, *a*, *b*).

Wings hyaline; calyptrae and halteres hyaline to pale yellowish hyaline.

Abdomen dark; basal two tergites in male mostly yellowish; tergites 1 to 3 with a dark median spot, 3 and 4 with a pair of velvety brownish to black spots; all segments overlaid with sparse gray pruinescence. Females with yellowish basal area much reduced and with paired spots on tergites 2 to 4; apex of tergite 4 usually yellow to fulvous.

DISTRIBUTION: Malaya, Buru, New Hebrides, Caroline Is.

PALAU. 22. KOROR: Apr., May, Sept., Nov., Dec., 1952, 1953, 1957, Beardsley, Sabrosky. BABELTHUAP: Ngerehelong, Ngardmau, May 1957, Sabrosky. PELELIU: Jan., May 1948, Beardsley, Sabrosky.

CAROLINE ATOLLS. IFALUK: One, Ifaluk I., Sept. 1953, Bates.

TRUK. WENA (Moen): May 1946, Townes.

In addition to the Micronesian specimens I have seen a series from Segond Channel, Espiritu Santo, New Hebrides. A paratype of *ciliata* from Buru, in U. S. National Museum, seems identical with two males and one female from Federated Malay States and determined as *inaequalis* Malloch by Malloch when at the U. S. National Museum. Notes and sketches of the fifth sternite of the type of *inaequalis* were kindly made by Mr. Oldroyd of the British Museum (Natural History) and confirm the similarity of the bristling of the fifth sternite in *ciliata* and *inaequalis*.

This species seems to be the most widely distributed of those occuring in Micronesia. The male is easily recognized by the uniform fringe of short black hairs on the inner margin of the processes of the fifth sternite (figs. 1, *c*; 7, *a*; 9, *e*, *f*).

7. **Parvisquama fulvafacies** Snyder, new species (figs. 7, *f*; 8, *a*; 9, *g*; 10, *c*, *d*).

Male: 3.0 mm. long. Similar to *ciliata*. Face and cheeks yellow to golden pruinescent and parafrontals usually more yellowish gray. Antennal segment 3 entirely yellow to fulvous and only a limited portion of 2 is fuscous.

Legs entirely yellow. *F2* with one preapical *pv* seta more well developed than other short ones in the almost uniform row of setae on apical half, and these slightly longer and more closely placed than their opposite ones on *av* surface (fig. 10, *c*, *d*).

Abdomen yellow to fulvous; tergite 3 with a pair of large brown spots and a faint median brown line, 4 with a pair of larger and darker brown spots, 1 and 2 sometimes with faint indications of paired darker yellow spots. Prebasal hypopygial tergite with a narrow brown apical band. Sternite 5 as in figures 7, *f*; 9, *g*, superior forceps as in figure 8, *a*.

Female: 3.7 mm. long. Tergites 2 to 4 each with two large brown spots, and with a faint to dark median spot on 2 and 3.

Holotype, male (US 67161), Mt. Buache, 500-643 m., Kusaie I., Aug. 19, 1946, Townes; allotype, female, Mt. Tafeayat, 540-643 m., Kusaie I., Aug. 20, 1946, Townes. Paratypes (BISHOP, US): three males, six females, same data as holotype; female, same data as allotype.

DISTRIBUTION: Caroline Is. (Kusaie).

8. Parvisquama mariana Snyder, new species (figs. 7, *d*; 8, *e*; 9, *c, d*).

Male: 3.0 mm. long. Very similar in color to *ciliata*. Antennal segment 3 entirely fulvous. *F2* as in *fulvafacies*. Sternite 5 as in figures 7, *d*; 9, *c, d*. Superior forceps as in figure 8, *e*.

Holotype, male (US 67162), Mt. Lamlam, Guam, Mariana Is., Oct. 1952, Krauss; paratype male (BISHOP), topotypical, Oct. 1957, Krauss.

DISTRIBUTION: S. Mariana Is. (Guam).

There is a female from Mt. Lamlam, Guam (400 m., Nov. 27, 1952, Gressitt), 3.3 mm. long, which differs from the male in having dark apical shadows on the third antennal segment, and lacks the distinct preapical *pv* seta on *F2*.

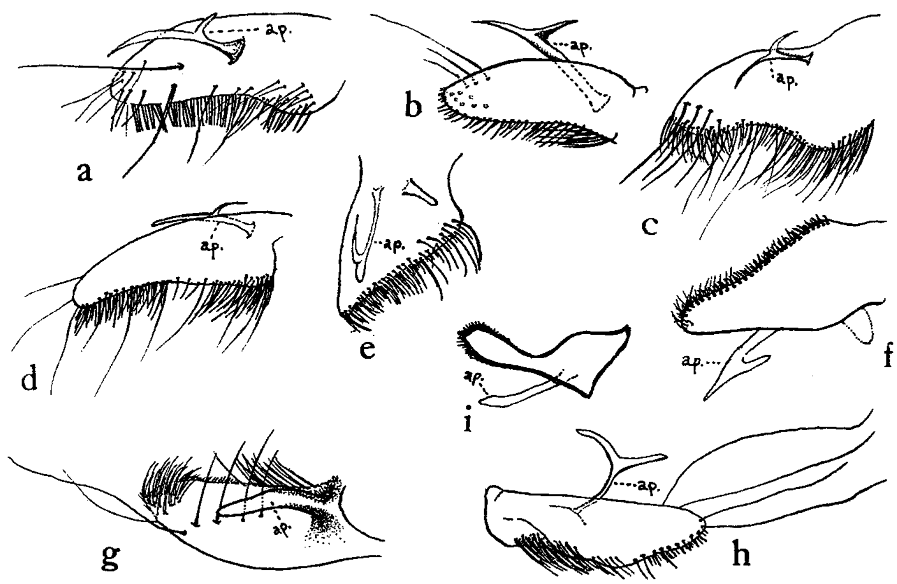


FIGURE 9.—Male fifth abdominal processes: **a,** *Parvisquama trukensis,* inner surface; **b,** *P. trukensis,* outer surface; **c,** *P. mariana,* inner surface; **d,** *P. mariana,* outer surface; **e,** *P. ciliata,* inner surface; **f,** *P. ciliata,* outer surface; **g,** *P. fulvafacies,* inner surface; **h,** *P. bifurcata,* outer surface; **i,** *P. simplex,* dorsolateral view (ap, appendage of fifth sternite).

In these characters it is similar to females of *ciliata*. Since there are no males of *ciliata* from the Mariana Is., I hesitate to identify this female as *ciliata*; on the other hand, without a longer series of males and associated females of *mariana,* I refrain from designating the above female as the allotype of *mariana.*

9. Parvisquama simplex Snyder, new species (figs. 7, *e*; 8, *f*; 9, *i*).

Male: 3.0-3.3 mm. long. Similar in color to *ciliata* but antennal segment 3 is entirely fulvous. *F2* as in *fulvafacies*. Sternite 5 as in figures 7, *e*; 9, *i*.

Holotype, male (US 67163), Nanpil, Net District, Ponape I., Feb. 25, 1948, sweeping, Dybas; paratype male (BISHOP), Ponape, Jan. 11, 1953, s.e. Nanponmal, 70 m., light trap, cut native forest, Gressitt.

DISTRIBUTION: Caroline Is. (Ponape).

Both specimens are teneral; the first two abdominal segments appear to be entirely yellow and the remainder light fuscous with the usual dark spots and gray pruinescence, but they are quite crumpled and the color and markings cannot be seen clearly.

10. **Parvisquama bifurcata** Snyder, new species (figs. 7, *b*; 8, *b*; 9, *h*).

Male: 3.0 mm. long. Face and antennae of males as in *fulvafacies,* remainder of fly as in *ciliata* except preapical *pv* on *F2* is very slightly longer than other adjacent *pv* setulae. Sternite 5 and superior forceps as in figures 7, *b*; 8, *b*; 9, *h*.

Holotype, male (US 67164), paratype male, Malakal I., Palau Is., May 2, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

11. **Parvisquama trukensis** Snyder, new species (figs. 7, *c*; 8, *d*; 9, *a*, *b*).

Male: 3.2 mm. long. Very similar to *ciliata. F2* with preapical *pv* seta very short but usually distinct. Sternite 5 and superior forceps as in figures 7, *c*; 8, *d*; 9, *a*, *b*.

Holotype, male (US 67165), Moen, Truk, Civ. Ad. Area, Mar. 5, 1949, Potts; paratypes: topotypical, male, Mar. 21, 1949, Potts; male, Moen, Truk, 0-133 m., May 23, 1946, Townes; male, Nama I., Oct. 21, 1952, Beardsley.

DISTRIBUTION: Caroline Is. (Truk).

A single female has been associated with males of *bifurcata* and *trukensis* on the basis of the similar locality of collections. I have been unable to find satisfactory characters to otherwise distinguish them from each other or from the female discussed under *mariana*; all three females have the third antennal segment slightly darkened apically and are practically indistinguishable from the females of *ciliata.* The preapical *pv* seta on *F2* is slightly stronger than other setae in the *pv* apical series and is the only character I have been able to find to distinguish these three specimens from *ciliata.*

Genus **Orchisia** Rondani

Orchisia Rondani, 1877, Dipt. Ital. Prodr. **6**: 279.

Type species: *O. costata* Meigen.

Front broad in both sexes. Parafrontals with a pair of strong anterior convergent bristles, a very strong and a much weaker pair of reclinate ones beyond middle, outer verticals strong and somewhat reclinate. In profile (fig. 20, *a*), eyes almost round; parafacials, parafrontals, their juncture, and cheeks almost obscured. Antennae not especially prominent. Arista short plumose. *Dc* 1:3; *st* in an equilateral triangle. Basolateral scutellar bristles absent, apicals strong. Costal margin of wings with a dark cloud which becomes paler posteriorly and apically. Costa uniformly thickened

to just beyond second vein, then very abruptly narrowed but reaches apex of fourth vein. Third and fourth wing veins subparallel apically. Lower lobe of calyptrae slightly larger than upper one. *T1* without a median *p* bristle. *T3* with a basal *ad,* but without a basal *pd* bristle; a median and preapical *ad,* and a preapical mid *d* bristle.

12. **Orchisia costata** (Meigen). (Figures 3, *b*; 20, *a.*)
Sapromyza costata Meigen, 1826, Syst. Beschreib. **5**: 266.

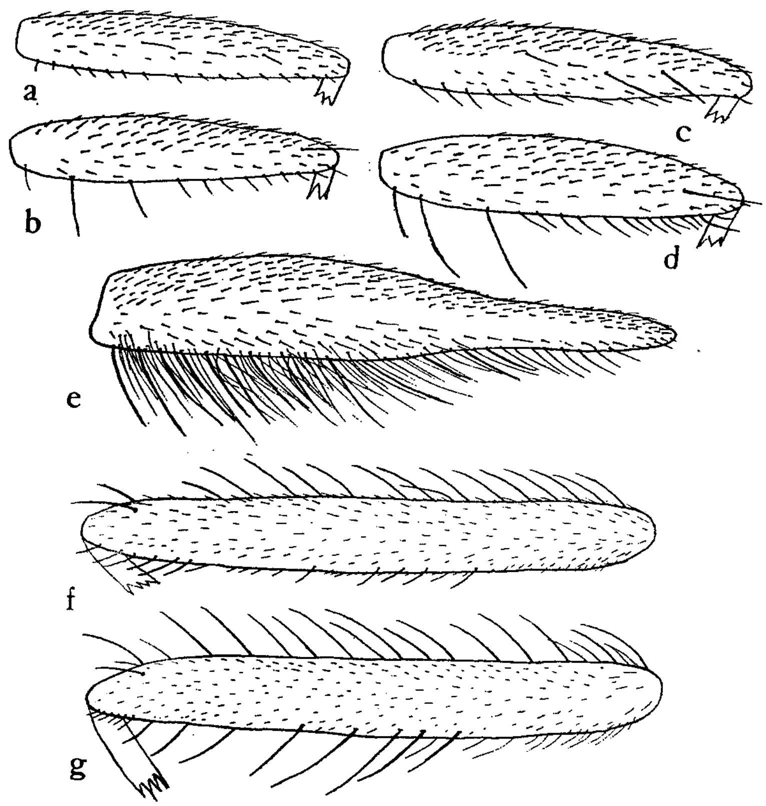


FIGURE 10.—**a,** *Parvisquama ciliata,* female *F2,* anterior surface; **b,** *P. ciliata,* same, posterior surface; **c,** *P. fulvifacies,* female *F2,* anterior surface; **d,** *P. fulvifaceis,* same, posterior surface; **e,** *Lispe assimilis,* male *F2,* anterior surface; **f,** *Dichaetomyia rufa,* male and female *F3,* posterior surface; **g,** *D. trukensis,* male *F3,* posterior surface.

Coenosia marginata Wied., 1830, Aussereur. Zweifl. Ins. **2**: 440.
Coenosia pictipennis Loew, 1858, Wiener Ent. Monatschr. **2**: 10.

DISTRIBUTION: Central and southern Europe, China, Madagascar, Africa, Taiwan, Samoa, Fiji, Lesser Sunda Islands, Bonin Is., N. Mariana Is., Caroline Is.

BONIN IS. 66. CHICHI JIMA: Omura, Okumura, Sakai-ura, Chihiro-iwa, Yoake-Yama, Apr.-June 1958, Snyder; ANI JIMA: Southwest Bay, May 1958, Snyder; OTOTO JIMA: Kammuri-iwa, Hirone, Apr.-June 1958, Snyder.

N. MARIANA IS. PAGAN: One, Laguna-Malas, Apr. 1940, Yasumatsu.

PALAU. 10. KOROR: Apr., Dec. 1953-1957, Beardsley, Sabrosky. BABELTHUAP: Ulimang, Dec. 1947, Dybas; Ngerehelong, May, Sept. 1952, 1957, Beardsley, Sabrosky; Airai Ngarsung, Ngardmau, May 1957, Sabrosky.

YAP. Eight. YAP: Southern part, July-Aug. 1950, Goss; MAP: South and central part, July-Aug. 1950, Goss.

CAROLINE ATOLLS. NOMWIN: One, Fananu I., Feb. 1954, Beardsley.

TRUK. Seven. WENA (Moen): 0-133 m., May 1946, Townes; Civ. Ad. Area, Feb., Mar. 1949, Potts. TON: Mt. Unibot, Dec. 1952, Gressitt. FEFAN: May 1946, Townes.

PONAPE. One, Mt. Nanalaud, about 333-500 m., Mar. 1948, Dybas.

This species was numerous sweeping over grass in the Bonin Islands and I have also taken many females on blossoms of cassava in West Africa.

The dark anterior margin of the wing blending into milky hyaline apically and posteriorly (fig. 3, *b*), the entirely yellow legs and third antennal segment, as well as the bristling of *T3*, will readily distinguish this conspicuously marked little species. It is the only member of the genus.

Genus **Pectiniseta** Stein

Pectiniseta Stein, 1919, Archiv Naturgesch. (1917) A, 83, **1**: 145.—Malloch, 1929, Insects of Samoa **6** (3): 163; 1929, Ann. Mag. Nat. Hist. X, **4**: 326. —van Emden, 1940, Ruwenzori Exped. **2** (4): 97, 245.—Snyder, 1953, Am. Mus. Novitates **1608**: 3.

Type species: *P. prominens* Stein.

Frons in both sexes 0.33 to 0.35 of head width at vertex, broadened to 0.42 to 0.46 at base of antennae. Frontal triangle extends to base of antennae. Juncture of parafacials and parafrontals slightly protuberant. Antennae long and prominent in profile, inserted at or above dorsal 0.33 of eyes and extending to oral margin. Arista of male long-haired on dorsal surface only; of female long-haired on dorsal and ventral surfaces. *T3* with only basal to subbasal *pd* bristle long and conspicuous.

13. Pectiniseta prominens (Stein). (Figure 20, *b, c.*)

? *Coenosia pectinata* Stein, 1900, Term. Füzetek **23**: 147.

Caricea prominens Stein, 1910, Akad. Wiss. Wien, Denkschr. **71**: 152.

"An unidentified genus and species of Anthomyidae," Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 47, 112.

Male, female: Head black, gray pruinescent; frontal triangle broad, complete; remainder of frontal vitta dull black. Antennal segment 2 fuscous, fulvous apically; segment 3 fulvous basally, often becoming brown apically, densely gray pruinescent. Arista brown; long-haired only on dorsal surface in male (fig. 20, *b, c*), but long-haired on both surfaces in female. Palpi yellow to fulvous.

Thorax fuscous, gray pruinescent; with three narrow brown vittae. *Dc* 1:3, anterior accessory *presut dc* setula short, but slightly longer than *ac* setulae which are in two to four irregular rows; *ia* 2. Lower stigmatal bristle directed downward. Basal and apical scutellar bristles strong, subequal.

Coxae and femora, except their extreme bases and apices, fuscous to brown; remainder of legs yellow to fulvous. *F1:* a row of long *pd* and *pv* bristles; base of *av* surface with a few short setulae in male, absent in female. *T1* without median bristles; the apical *d, pd* and *p* longer than *T1* diameter; apical *pv* in female very long. *F2:* a median *a* and a preapical *p* and two or three *v* bristles on basal 0.33. *T2:* a long median *p*; apical *d* and *pd* slightly longer than *T2* diameter; while *ad, a, av, v,* and *p* bristles are three times as long. *F3:* three to five *av* bristles which are longest on apical 0.5, especially in male; a very long submedian *v*. *T3: ad,* surface with a short, basal, a long median, and a short preapical bristle; a short median and apical *av*; a distinct basal *pd*; and a longish preapical mid *d* bristle.

Wings subhyaline. Costal thorns and setulae not unusually conspicuous, but setulae end abruptly slightly beyond termination of second vein; costa continued as a very thin vein to apex of fourth. Third and fourth very slightly divergent apically. Posterior cross vein indistinctly curved. Calyptrae whitish hyaline; lower scale rounded apically, distinctly longer than upper one. Halteres yellow.

Abdomen fulvous at base, and frequently at apices of tergites 2 and 4, the remainder fuscous, gray pruinescent; with a dark median vitta on 2 and 3 which extends less distinctly onto 1; 2 to 4 with a pair of large, round to subquadrate, brown spots.

DISTRIBUTION: Socotra, Taiwan, Malaya, Samoa, Society Is., New Guinea?, Africa?, S. Mariana Is., western to eastern Caroline Is.

S. MARIANA IS. Eight. GUAM: Mar. 1952, Liming; Pt. Oca, May 1945, Gressitt; Pilgo R., May 1945, Bohart and Gressitt; Piti, May 1936, Usinger; southeast coast, 1945, Bohart and Gressitt; Nimitz Beach, Aug. 1952, Krauss; Agana, May 1936, Swezey.

PALAU. 104. BABELTHUAP: Melekeiok, Apr. 1957, cacao; May 1957, at light, jungle, mangrove, and under mango tree; Ngiwal, May 1957, jungle, at light, and along stream; Ngardok, May 1957; Ngaremlengui, June 1957, at light; Ngerehelong, May 1957; Imeliik, Netkeng, June 1957; Airai, Ngerimal R., May 1957, all by Sabrosky. KOROR: Mar., May 1954, 1957, Beardsley, Sabrosky. NGARMALK: Apr. 1957, at light, Sabrosky. MALAKAL: May 1957, Sabrosky.

YAP. YAP: Aug., Oct. 1952, Krauss; Giliman, June 1957, Sabrosky; Kolonia, June 1957, Sabrosky; Mt. Gillifitz, 150 m., Nov. 1952, Gressitt; Ruul Distr., July-Aug. 1950, Goss. MAP: Chol, June 1957, Sabrosky; southern part, July-Aug. 1950, Goss; Gagil Distr., July-Aug. 1950, Goss; Tarang, June 1957, Sabrosky.

CAROLINE ATOLLS. 16. WOLEAI: Falalis I., Feb. 1953, Falulap I., Feb. 1953, Beardsley. LAMOTREK: Lamotrek I., Feb. 1953, Beardsley. NOMWIN: Nomwin I., Feb. 1954, Fananu I., Feb. 1954, Beardsley.

TRUK. 10. WENA (Moen): Feb.-Oct. 1952, Feb. 1954, Beardsley; Civ. Ad. Area, Mar.-Apr. 1949, Potts; S. Valley, Mt. Tonaachau, Apr. 1949, sweeping over seepage, Potts. TON (Pata): Sabote Epin, Apr. 1940, Yasumatsu and Yoshimura; Mt. Unibot, 25-50 m., Dec. 1952, Gressitt.

PONAPE. Three, Colonia, Jan. 1953, light trap, cacao grove, Gressitt.

KUSAIE. Five, Mutunlik, Feb., Mar. 1953, light trap, Clarke.

Adults were taken at carrion-baited traps and by sweeping vegetation in a coconut grove, according to Bohart and Gressitt (1951). Labels on specimens indicate that they are attracted to light and swept over seepage. Malloch (1929, Ann. Mag. Nat. Hist. X, **4**: 326) suggests the larvae live in decaying fruit and are distributed in commerce.

Genus **Lispocephala** Pokorny

Lispocephala Pokorny, 1893, Zool.-Bot. Ges. Wien, Verhandl. **43**: 532.—Malloch, 1928, Hawaiian Ent. Soc., Proc. **7**: 67; 1929, Federated Malay States Mus., Jour. **14**: 648; 1929, Treubia **7**: 392; 1935, Ann. Mag. Nat. Hist. X, **16**: 220, 562.—Hennig, 1952, Beitr. zur. Ent. **2**: 67.

Type species: *L. miki* Strobl.

Front broad in both sexes; frontal triangle complete. Two pairs of parafrontal bristles on posterior half reclinate, anterior one of these longer than posterior one. Arista short to long plumose almost to tip. *Dc* 1 : 3, or if 2 : 3, anterior *presut* one very short; basolateral and apical scutellars long, strong, subequal. *St* 3, in an equilateral triangle. Lower stigmatal bristle downwardly directed, weaker than upwardly directed dorsal bristle. Prosternum, propleura, pteropleura, and hypopleura bare. Third and fourth wing veins subparallel apically. Lower calyptrae rounded apically and distinctly longer than upper ones (fig. 11, *a*). *T1* usually without median bristles. *T3* with a basal *ad* and *pd* in addition to one or two others beyond.

Key to Micronesian Species of Lispocephala

Longest aristal hairs on both surfaces longer than length of antennae; *F2* with a single preapical *p* bristle; apical *pd* on *T3* not as long as *T3* diameter .... **14. beardsleyi**

Longest aristal hairs on both surfaces not more than 0.6 length of antennal segment 3; *F2* with two preapical *p* bristles; apical *pd* on *T3* much longer than *T3* diameter .... **15. dispersa**

14. **Lispocephala beardsleyi** Snyder, new species.

Male: 2.9 mm. long. Head black, grayish pruinescent; frontal vitta velvety black at sides of complete triangle. Front at vertex 0.32 of head width, broadened to 0.36 at base of antennae. Parafrontals: two anterior convergent, and two posterior pairs of reclinate bristles; most anterior parafrontal bristles very long and strong, about twice as long as two subequal reclinates; second one convergent, very short and almost hairlike, less than 0.5 length of reclinates. Anterior and posterior ocellars and postvertical bristles subequal, only slightly longer than second anterior convergent parafrontal setula. Only anterior portion of parafrontals and their juncture with parafacials visible in profile, juncture about 0.5 as long as width of narrow antennal segment 3. Cheeks scarcely higher than greatest aristal diameter. Posterior margin of eye distinctly emarginate and narrowed below. Antennae yellow; inserted near middle of eyes and ending slightly above their lower margin; segment 3 is 2.1 times as long as 2. Arista brown, basal segments not unusually thickened; both surfaces with very long

rays, the longest on one surface at least 0.8 or more length of antennal segment 3. Palpi yellow, slightly brownish at base.

Thorax black, grayish pruinescent and with a very faint median brownish vitta. Acrostical setulae in two to four irregular rows from anterior *presut* to posterior *postsut* portion; prescutellar *ac* setulae stronger than adjacent *ac*. Anterior accessory *dc* setula distinct, but not more than 0.25 length of *presut dc* bristle. *Ia* 2, short and weak; lower stigmatal very short. Posterior mesopleural row with a strong dorsal and ventral bristle and three to five much shorter irregular ones between.

Legs yellow, extreme tips of *F2*, and *F3* fuscous; tarsal segments 4 and 5 blend into brown apically. *F1:* usual row of strong *pd* and *pv* bristles; clothing setulae on *p* surfaces in two to three irregular rows; a few short *av* setulae on basal 0.33, none of which are longer than *T1* diameter. *T1:* apical *d* and *p* long and strong, *p* 1.5 to 2.0 times as long as *d*; *pd* and *pv* not longer than *T* diameter. *F2:* a median *a* bristle, three to four short *av* setulae at basal 0.25, two long *v* to *pv* on basal 0.5 and a single preapical *p* bristle. *T2:* a single median *p* bristle; apical *ad* and *d* very short, only apical *av* and *pv* strong, longer than *T2* diameter. *F3:* three to five widely separated *av* bristles which become longest toward apex of *F3*; a very long median *pv* to *v*, and one or two short ones basal and beyond; without a well-defined preapical *pv*. *T3:* a weak *pd* and a stronger *ad* near base; a very long *ad*, a somewhat shorter *av*, and a short, weak *pd* at middle; a very long mid *d* near apex, and a shorter apical *a*, *pv* and *av* bristle.

Wings: hyaline, very faintly tinged. Costal thorns undeveloped. Setulae very short. Posterior cross vein straight, inserted opposite basal 0.33 of first posterior cell; anterior cross vein opposite middle of discal cell. Calyptrae white; halteres yellow to fulvous.

Abdomen: Segments 1 to 3 mostly fulvous, 4 and basal hypopygial segment dark; 2 to 4 with a pair of large, round, brown to black spots and a median dark, poorly defined vitta on 2 and 3. In dorsal and lateral view, 1 to 4 and basal hypopygial segment subequal in length. Sternite 5 with a broad, deep, U-shaped incision, and without distinctive setulae.

Holotype, male (BISHOP 3554), Koror, Dec. 28, 1952, at light, "M5722," Beardsley; paratype, male, topotypical, Jan. 12, 1953, Beardsley.

DISTRIBUTION: Caroline Is. (Palau).

The type possesses a third reclinate posterior parafrontal bristle on the left side and is probably abnormal in this character. The paratype is somewhat greased and the colors not as distinct as in the type.

The very long aristal hairs on both surfaces will distinguish this species from any other *Lispocephala*.

15. **Lispocephala dispersa** Snyder, new species (fig. 11).

Male: 3.1-3.2 mm. long. Head: black; pruinescence on occiput grayish; on remainder of head grayish yellow to yellow except occasionally face appears almost chocolate brown below antennae. Frontal triangle complete, dark velvety portion of frontal vitta confined to a narrow U- to V-shaped anterior mark. Front at vertex 0.34 to 0.37 of head width, parallel-sided or only very slightly broadened between first and second pair of parafrontal bristles. Parafrontals: a single strong anterior pair of convergent bristles and a few short hairs behind it. Two pairs of posterior reclinates, anterior pair almost twice as long as posterior pair; anterior ocellar bristles subequal to posterior reclinate parafrontals; inner verticals very long and strong, outers short but well differentiated from dorsals in postocular row; postocellars divergent, weak. In profile (fig. 11, *c*), parafacials and parafrontals mostly obscured, their juncture about as long as greatest aristal diameter. Cheeks about 0.5 as high as width of antennal segment 3. Antennae bright fulvous, inserted near middle of eyes and ending

above their lower margin. Segment 3 is 2.4 to 2.6 times as long as 2. Arista dark brown, longest hairs confined to basal 0.33, but rays continue to apex; longest on both surfaces including aristal diameter 0.8 to 0.9 as long as width of antennal segment 3. Palpi slender, yellow to yellowish white. Mentum subshiny, pale brown.

Thorax black, cinereous gray pruinescent; with three very narrow and rather indistinct brownish vittae in *ac* and *dc* planes. Scutellum unmarked. *Ac* setulae in two to three irregular rows. Accessory anterior *presut dc* setula about 0.25 to 0.33 as long as *presut dc* bristle; *ia* 2.

Legs yellow; mid and hind coxae fuscous, gray pruinescent; *F3* with a limited apical brown spot which is most intense dorsally. *F1:* four to six slender *av* setulae on basal

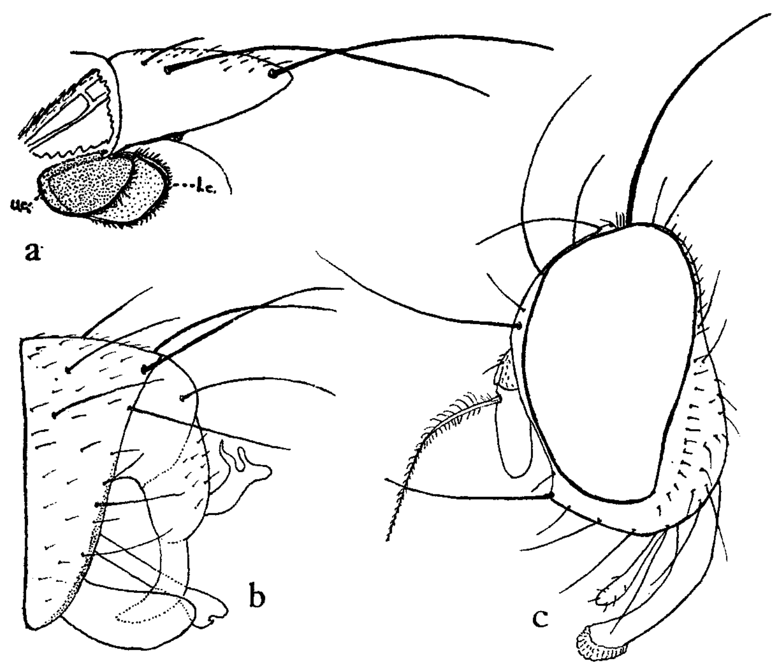


FIGURE 11.—*Lispocephala dispersa:* **a**, calyptrae and scutellum, lateral view (uc, upper calypter; lc, lower calypter); **b**, male copulatory appendages, lateral view; **c**, male head, lateral view.

0.5, longest almost as long as height of *F1* where situated; usual *pd* and *pv* row of bristles; *pv* surface just above row of bristles has a strip devoid of clothing setulae. *T1:* apical *d, pd,* and *pv* slender, two to three times as long as *T1* diameter. *F2:* a median *a* bristle; a few *av* hairs on basal 0.5 distinctly longer than those on apical 0.5; a long median *v* to *pv* and a shorter basal one. *T2:* a median *p*; apical *pd* about 0.5 to 0.6 as long as strong apical *ad, av, v,* and *pv* bristles. *F3:* a row of about five *av* bristles, three on apical 0.5 strongest; a single long median *pv* and usually a very much shorter basal and apical setula. *T3:* a long median *ad* and a shorter subbasal and subapical bristle; one median *av,* a subbasal median and subapical *pd* setula; preapical mid *d* long, about as long as length of hind metatarsus, or median *ad* bristle.

Wings hyaline, faintly tinged, costal setulae normal, thorn undeveloped. Posterior cross vein perpendicular, inserted opposite basal 0.4 of first posterior cell; anterior cross vein opposite middle of discal cell. Calyptrae whitish hyaline; halteres yellow.

Abdomen dark except a variable dorsal portion of first two tergites and the lateral margins of 1 to 3 which are narrowly fulvous; all grayish pruinescent; a pair of round, dark dorsal spots on 2 to 4, and a somewhat linear, median one on 3 and 4. In profile, tergite 4 somewhat wedge-shaped, narrowest below; posterior margin with three to four long, widely separated bristles which are subconfluent with the six strong apical dorsal ones. Basal sternites bare. Lobelike processes of sternite 5 large, broad, and almost bare. Genitalia as in figure 11, *b*.

Female: 4.6 to 4.9 mm. long. Similar to male; differs in having the second convergent parafrontal hair strong.

The *av* setae on *F1* somewhat shorter.

Abdomen more extensively fulvous; but with a median spot and a pair of lateral dark spots on tergites 2 to 4. Dorsal bristles on tergites 3 and 4 longer, stronger, and more numerous.

Holotype, male (BISHOP 3555), Ponape, Colonia, Agric. Expt. Sta., Jan. 20, 1953, Gressitt; light trap, cacao grove, Gressitt; allotype, female, topotypical, Jan. 6, 1953, but without cacao grove or collector label but has Pac. Sci. Bd. label; paratypes (US, BISHOP): male, same data as type; female, same data as allotype but Jan. 8 and alt. 16 m.; two males, six females, Ponape, Mt. Temwetemwensekir, Jan. 15-19, 1953, 16 and 180 m.; female, Ponape, S.E. Nanponmal, Jan. 19, 1953, on dead giant snail, Gressitt.

Additional records. Palau. Babelthuap: One, E. Ngatpang, Dec. 8, 1952, 65 m., light trap, Gressitt. Koror: Four, June, Sept. 1952, 1953, at light, Beardsley. Kusaie: One, Lele, 100 m., Feb. 18, 1953, Clarke; two, Mutunlik, 22 m., Feb. 19, 1953, Clarke.

DISTRIBUTION: Caroline Is. (Palau, Kusaie, Ponape).

The specimens from Palau have the third antennal segment with a variable apical dark shadow. I can see no differences between the genitalia in the single male and those in the type series. Because of the above slight differences these specimens have not been made paratypes; on the other hand, I hesitate to consider them as representing distinct species or subspecies without additional material. The Kusaie specimens, which are all females, have the dark abdominal spots smaller and without as extensive grayish pruinescence as those of the type series.

Genus **Cephalispa** Malloch

Lispocephala (*Cephalispa*) Malloch, 1935, Federated Malay States Mus., Jour. **17**: 658.

Type species: *C. scutellata* Malloch.

Front at vertex 0.20 of head width, gradually broadened to 0.25-0.30 at base of antennae in both sexes. Frontal triangle scarcely differentiated, extending at most not more than 0.2 distance to base of antennae. In profile eyes very much higher than long, distinctly emarginate on lower 0.5. Arista plumose. Anterior two pairs of para-

frontals convergent; posterior two pairs strong, subequal, and reclinate. Ocellar bristles scarcely differentiated from surrounding hairs. *Dc* 2: 3, anterior adventitious *presut* one quite short, though longer than *presut ac* setulae. Basolateral and apical scutellar bristles strong, subequal. *St* 3, in an equilateral triangle. Lower stigmatal bristle directed ventrally, about 0.5 as long as upwardly directed dorsal one. Third and fourth wing veins subparallel apically; sixth and seventh veins quite long, ending about 0.2 their length from wing margin. Costal vein not quite as abruptly constricted beyond second vein as in *Orchisia*. Lower calyptrae extends posteriorly far beyond apically rounded dorsal one. In profile, male abdomen is lanceolate apically; side of abdomen at middle has tergites 1 to 3 together as long as 4; the "fifth" or prebasal hypopygial segment about 0.5 as long as 4. Female abdomen normal. *T1* without a median *p*. *T3* with an *ad* and *pd* bristle at basal 0.33; without a median *pd* but with a strong median *ad*, and a weaker *av*; preapical mid *d* strong, without a long apical *p* or *pv* bristle.

16. **Cephalispa gressitti** Snyder, new species (fig. 1, *e*).

Male: 5.7 mm. long. Head: occiput and face orange fuscous but overlaid with very dense white pruinescence, giving these regions an apparent grayish color; parafacials yellow, grayish pruinescent; front gray; parafrontals grayish pruinescent; frontal vitta densely yellowish brown pruinescent and without a clearly defined triangle. In frontal view, head almost circular; front at vertex 0.20 of head width, widened to 0.29 at base of antennae. Parafrontals: two pairs of strong convergent anterior bristles on anterior 0.20, a long and a short reclinate pair on posterior 0.5; and two or three short accessory hairs between all bristles. Anterior and posterior ocellar bristles very short, latter outwardly directed. Postocular setulae in a single row but with some irregular ones opposite narrow ventral portion of eyes. In profile, parafacials, parafrontals, and their juncture almost obscured; cheeks about 0.5 to 0.6 as high as width of antennal segment 3. Antennae yellow; inserted opposite middle of eye and terminating at least the width of antennal segment 3 above oral margin; segment 3 is 2.1 times as long as 2. Arista brownish yellow, short plumose to tip, longest hairs (dorsal surface) about as long as width of antennal segment 3. Palpi yellow, slender.

Thorax mostly pale in ground color, only dorsum, including most of scutellar dorsum, subfuscous; all portions densely gray pruinescent, and without clearly defined vittae; but with dark dorsal median reflections in dorsolateral view. *Ac* setulae sparse, in three to five irregular rows; anterior *presut* accessory *dc* setula very short; *ia* 2, both short. Lower stigmatal bristle ventrally directed.

Legs yellow. *F1* normal but with a few short *av* on basal 0.25. *T1* without median bristles; apical *d, pd* and *pv* to *v* subequal, about as long as *T1* diameter. *F2* without distinct *a* or *av* bristles; three *v* to *pv* on basal 0.5 and a single preapical *p*. *T2:* two on basal 0.5 and only apical *v* long and prominent, three or more times as long as *T2* diameter; other apicals shorter than, or not more than, 1.5 times *T2* diameter. *F3:* three to four *av* bristles on basal 0.5; a long *pv* at basal 0.33 and one or two much shorter ones basad and beyond; a single preapical *ad* and *pd*. *T3:* apical mid *d* about 2.5 to 3.0, and *ad* about 1.5 to 2.0 times as long as *T3* diameter; apical *pd* scarcely distinguishable from clothing setulae; median *av* short and scarcely distinguishable. Coxae, trochanters, and tarsi not unusually modified or bristled.

Wings faintly yellow hyaline. Costal thorns indistinguishable from setulae. Posterior cross vein straight, inserted opposite basal 0.36 of first posterior cell, and the anterior cross vein opposite middle of discal cell. Calyptrae hyaline margins somewhat white. Halteres yellow.

Abdomen brownish fulvous. Very short visible tergites 1 to 3 mostly subshiny, but with a pair of irregular dark spots on 3; tergite 4 and basal hypopygial segment very long and irregularly darkened dorsally, with distinct grayish pruinescence on sides. In profile, abdomen distinctly lanceolate, basal hypopygial segment long and prominent and distinctly pointed at apex, about as long as tergite 4, both about 0.6 as long as the distance from apex of tergite 3 to base of abdomen (fig. 1, *e*). Sternites:

basal one bare; 4 and 5 much longer than 2 or 3; 5 with processes expansive, and in lateral view, with a distinct apical tooth; without bristles along apical margin of processes.

Female: 5.5 mm. long. Similar to male, except *ac* setulae are in more regular rows; *F2* with two median *a* bristles; apical *a* and *p* on *T2* longer and median *av* on *T3* more clearly defined.

Abdomen with tergites 1 to 4 normal, subequal in length. Tergites 2 to 4 with a pair of large, round, dark dorsal spots and a linear irregular median brown stripe. Ovipositor is probably very long.

Holotype, male (US 67166), allotype, female (US), paratype, female, all Kayangel Atoll, Palau Is., Ngajangel, Dec. 15, 1952, light trap, Gressitt; other paratypes: female, E. Ngatpang, 65 m., Babelthuap I., Dec. 8, 1952, light trap, Gressitt; female, Koror, Palau Is., May 27, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

This species appears close to the type species *scutellata* Malloch (*op. cit.*) but differs in having the second aristal segment only as long as thick and in the differently shaped fifth abdominal sternite.

Genus **Pygophora** Schiner

Pygophora Schiner, 1868, Reise Novara, Diptera, 295.—Malloch, 1921, Ann. Mag. Nat. Hist. IX, **7**: 168; 1929, Treubia **7**: 394; 1929, Insects of Samoa, Diptera **6** (3) : 160.—van Emden, 1942, Ann. Mag. Nat. Hist. XI, **9**: 98. —Hennig, 1952, Beitr. zur Ent. **2**: 58.

Type species: *P. apicalis* Schiner.

Front of both sexes gradually broadened from occiput to base of antennae. Parafrontals with two pairs of bristles on posterior 0.5 or less, anterior pair longest. Antennae usually long, segment 3 quite prominent. Arista long-haired on basal 0.5 of both surfaces; bare beyond. Eyes slightly to strongly emarginate posteriorly. *Dc* 1:3, though a short anterior accessory *presut* pair is often clearly defined; *pra* absent. *St* in an equilateral triangle. Basolateral and apical scutellar bristles strong, subequal. Prosternum, propleura, hypopleura, and pteropleura entirely bare. Third and fourth wing veins subparallel or divergent apically. All veins, except costa, bare. Lower calyptrae protruding posteriorly well beyond upper one. *T1* with a long median *p* bristle. *T3* with a basal *ad* and *pd* bristle in addition to one or two others at or beyond middle on each of these surfaces.

Adults are commonly taken by sweeping grass, flowers, and other low vegetation or occasionally on feces. Labels on the specimens in this collection indicate that they are also taken in light traps, and in rotting logs as provisions in wasp nests.

Nothing is known of the biology of the species, but adults of at least one species are predacious (as are many other Coenosiinae) on smaller flies. One poorly preserved, teneral female specimen (Yap, Tomil District, July 1950, Goss) which cannot be specifically identified but probably belongs to the *lobata* group, is labeled ex pitcher plant.

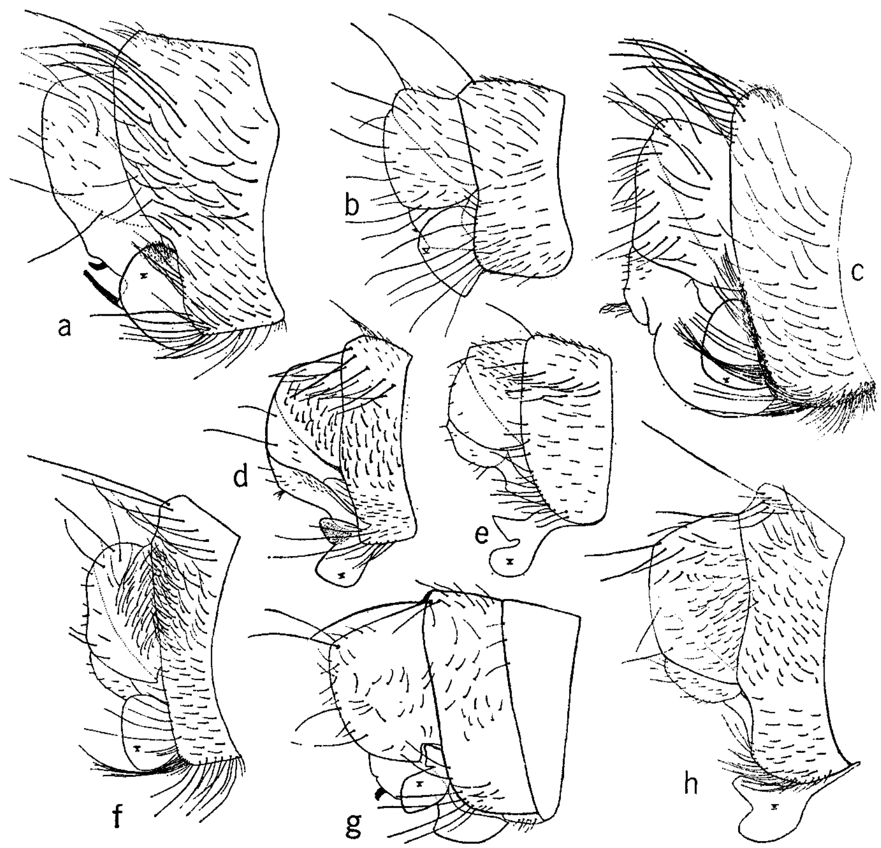


FIGURE 12.—Male apex of abdomen, lateral view: **a**, *Pygophora yapensis*; **b**, *P. kusaiensis*; **c**, *P. boninensis*; **d**, *P. minuscula*; **e**, *P. alaseta*; **f**, *P. lobata*; **g**, *P. oakleyi*; **h**, *P. edgari* (V, fifth abdominal sternite).

KEY TO MICRONESIAN SPECIES OF PYGOPHORA

MALES

1. Apex of *T3* with a distinct tooth (fig. 13, *h*)..........2
   Apex of *T3* simple..........5

2(1). Sides of globular basal hypopygial segment and fourth visible abdominal tergite below dorsal keel with numerous fine, closely placed, somewhat crinkled hairs (fig. 12, *f*)..........**17. lobata**
   Sides of basal hypopygial segment and fourth visible abdominal tergite with sparse, normal clothing bristles..........3

3(2). *F2* with a continuous row of short, strong *av* and *pv* bristles (fig. 13, *a, b*); *T3* with one median *pv* bristle..........**18. boninensis**
   F2 with two to five strong median *av* and *pv* bristles; *T3* with two to five median *pv* bristles..........4

4(3). Wings entirely hyaline; second visible abdominal tergite without a dark median spot .... 19. **yapensis**
Wings with a dark cloud at apex of second vein; second visible abdominal tergite with a dark median spot .... 20. **palauensis**

5(1). Entire fly yellow to brownish fulvous, or only occiput fuscous .... 21. **edgari**
At least some part of thorax or more of fly fuscous 6

6(5). *T3* with a brushlike clump of *pv* to *v* setae; longest at base and become gradually short to middle of *T3*; marginal hairs on posterior margin of wings longish and perpendicular to wing surface (fig. 3, *c*) .... 22. **alaseta**
T3 with only normal *pv* to *v* clothing setae on basal 0.5; marginal hairs on posterior margin of wings minute, normal and not perpendicular 7

7(6). Hind tarsal segments 2 and 3 with a fringe of longish *p* hairs (fig. 13, *f*); fore tarsal segment 4 with two or three stiff outstanding *a* and *p* spinules (fig. 13, *g*); preapical *ad, d* and *pd* bristles on *T3* longer than basal hind tarsal segment .... 23. **tarsaseta**
All hind tarsal segments with normal clothing hairs; at most only preapical *d* bristle subequal to length of hind metatarsus 8

8(7). Ventral clothing hairs on *F2* and *F3* long and conspicuous; *F2* without apical or preapical *p* bristles; dorsal keel on abdominal tergite 4 scarcely or not at all differentiated; sides of tergite 4 and basal hypopygial segment with short, decumbent clothing setulae; wing without an apical dark spot .... 24. **kusaiensis**
Ventral clothing hairs on *F2* and *F3* short and inconspicuous; *F2* with one or two distinct preapical *p* bristles; dorsal keel on tergite 4 conspicuous; sides of 4 and basal hypopygial segment with short, but conspicuous, upwardly curved setulae; wing with a dark apical cloud except in teneral specimens 9

9(8). Antennal segment 3 terminating at oral margin or a distance equal to diameter of vibrissae above it 10
Antennal segment 3 terminating at a distance almost equal to its width above oral margin .... 25. **mariana**

10(9). *F2* and *F3* with a strong median *v* to *pv* bristle; hairs on sides of abdominal tergite 4 and basal hypopygial segment soft and slender (fig. 12, *g*) .... 26. **oakleyi**
F2 and *F3* without a strong median *v* to *pv* bristle; hairs on sides of tergite 4 and basal hypopygial segment stout and strong (fig. 12, *d*) .... 27. **minuscula**

FEMALES

1. Legs entirely yellow 2
Legs with at least mid or hind coxae or more fuscous 4

2(1). Thorax fuscous 3
Thorax fulvous .... 21. **edgari**

3(2). Apex of second wing vein with a faint dark cloud .... 22. **alaseta**
Apex of second wing vein not clouded .... 25. **mariana**

4(1). Fore coxae mostly or entirely fulvous 5
Fore coxae entirely fuscous 8

5(4). First visible abdominal tergite entirely yellow; femora fuscous, only tips yellow to fulvous; species not over 3.5 mm. long .... 27. **minuscula**
First visible abdominal tergite fuscous in part or entirely; femora with extensive basal or apical yellow to fulvous streaks; species at least 5.0 mm. long 6

6(5). *F2* with a median *av* bristle which is as long as height of *F2* where situated .... **19. yapensis**
F2 without a strong median *av* bristle.. 7
7(6). *T3* with preapical *d* bristle longer than basal segment of hind tarsus.......... .... **23. tarsaseta**
T3 with preapical *d* bristle at most only as long as basal segment of hind tarsus .... **18. boninensis**
8(5). *F2* with a conspicuous median *av* bristle which is at least as long as height of *F2*.. **20. palauensis**
F2 without a conspicuous median *av* bristle... **17. lobata**

17. Pygophora lobata Stein (figs. 12, *f*; 13, *h*; 20, *d*).

Coenosia (*Pygophora*) *lobata* Stein, 1900, Term. Füzetek **23**: 147.

Pygophora lobata Stein, 1915, Suppl. Ent. **15**: 55.—Malloch, 1922, Ann. Mag. Nat. Hist. IX, **10**: 382.—Karl, 1935, Arb. Morph. Tax. Ent. Berlin-Dahlem 2 (1): 48.

Male: Head black; pruinescence on face and parafrontals yellowish gray, on frontal vitta fulvous, and on occiput grayish. Antennae entirely fulvous; inserted slightly above middle of eyes, and extending to opposite first strong setula above vibrissae on facial ridges (fig. 20, *d*). Arista brown. Palpi whitish yellow.

Thorax black, grayish pruinescent and with a narrow dark vitta in each *dc* plane.

Legs yellow except fuscous mid and hind coxae. *F1:* a row of 9 to 12 strong *pd* bristles on apical 0.60; and a row of four to seven slender somewhat dorsally situated *p* bristles, between which some short setulae are interspersed; with numerous short, stubby *v* clothing setulae which coalesce with a row of short, somewhat posteroventrally situated *v* bristles. *T1* with one *p*; without distinct *ad* bristles, except at apex. *F2:* two parallel rows of short *a* bristlelike setulae, apical seta in upper row longest, and basal or prebasal seta in lower row strong; four to six very strong *av* bristles on median 0.5, apical pair in this series usually thornlike and apically curved; apical 0.33 of *av* surface with a row of 10 to 12 extremely short, closely placed, moderately stout, ventrally directed setulae, apical one somewhat more slender than others and apically curved; with three or four median *pv* bristles, beyond which some shorter setulae extend to apex but none so stout as apical series on *av* surface; usually with one or two basal *p* bristles and two preapical *p*. *T3:* two *ad* and two *pd*, and a strong *pv* which is situated about midway between basal and median *pd* bristle; a strong *av* beyond median *ad* and a strong preapical *d*. With a distinct apical tubercle (fig. 13, *h*). Hind metatarsus slightly longer than remaining segments combined. *F3* with a row of very numerous, closely placed, long, slender *a* bristles on basal 0.75. Pulvilli and claws moderately well developed, claws with fringe of fine hairs but neither claws nor pulvilli as large as in *kusaiensis*. Mid coxae with a pair of rather closely placed, strong, moderately curved, posteriorly directed, thornlike bristles.

Abdomen yellow; apically compressed. Apical dorsal portion of tergite 3, and center of tergites 4 and 5 fuscous; 3 with three dark dorsal spots and 4 with a single median one. Tergite 5 with numerous, slender, outwardly and upwardly curled bristlelike hairs on dorsal 0.5 (fig. 12, *f*).

Wings hyaline or with a very pale yellow tinge; unspotted. Anterior cross vein situated slightly beyond middle of discal cell. Apical section of fifth vein 0.5 to 0.6 as long as posterior cross vein. Calyptrae white; halteres yellow.

Female: Head as in male, but antennal segment 3 has indications of faint dark apical shadows.

Coxae and basal 0.75 to 0.80 of all *F* fuscous; trochanters and remainder of legs fulvous. *T1* with two to three distinct *ad* bristlelike setulae. *F2:* apical bristle in two anterior rows stronger than much finer basal ones; and a complete row of *av* bristles

which become gradually shorter apically and not divided into two distinct groups of thorns and setulae; three to four *pv* bristles on basal 0.5. *F3:* three long *av* on apical 0.5 and three short ones on basal 0.5; and three long *pv* on basal 0.5. *T3* not modified apically, and without a submedian *pv* bristle.

Abdomen not apically compressed. Entire segment 1 and base and apex of 2 yellow; others fuscous, grayish pruinescent. Tergites 2 and 3 with two long brown dorsal spots, 4 not spotted dorsally; the sides of segments 2 to 4 each with a brown spot.

DISTRIBUTION: New Guinea, Malaya, Taiwan, Christmas Island, S. Mariana Is., Caroline Is., Marshall Is., Gilbert Is.

S. MARIANA IS. 27. GUAM: 1911, Fullaway; Agat, Sept. 1936, Swezey; Dededo, Sept. 1936, on *Ficus hodda,* Swezey; Piti, Sept. 1936, sweeping on morning-glory vine on cane, Swezey; July 1932, Oakley; Yona, Oct. 1952, Krauss; Mt. Bolanos, Aug. 1952, Krauss; Agana, Oct. 1957, Krauss; Mt. Lamlam, Oct. 1957, Krauss; Umatac, Mar. 1958, Snyder; Pt. Oca, Mar. 1946, Stuntz. SAIPAN: Nov., Jan. 1944, 1949, Maehler, Edgar; Susupe, Jan. 1946, Maehler; Achugau Area, Jan. 1945, Dybas; As Mahetog Area, Nov. 1944, Dybas. TINIAN: Nov. 1952, Beardsley.

PALAU. Seven. BABELTHUAP: Ngardmau, May 1957, Sabrosky; Ulimang, Dec. 1947, Dybas. KOROR: Sept. 1952, Krauss; Jan. 1953, light trap, Beardsley; on decaying giant African snail, May 1957, Sabrosky. ANGAUR: Jan. 1953, Beardsley. NGURUKDABEL (Urukthapel): Sept. 1951, ex *Messerschmidia,* Gressitt. PELELIU: N. E. Coast, Jan. 1948, Dybas. NGARMALK ("N.W. Auluptagel"): 25 m., Dec. 1952, in rotting log—wasp nest provision, Gressitt. NGERKABESANG (Arakabesan): 1946, Townes. MALAKAL: May 1957, Sabrosky.

YAP. 29. YAP: Mar. 1954, Beardsley; Aug., Sept., Oct. 1952, Krauss; Ruul Distr., July to Aug. 1950, Goss; Yap Hill, Dec. 1952, Gressitt. MAP: southern part, July, Aug. 1950, Goss; eastern part, July, Aug. 1950, Goss; Gagil Distr., July, Aug. 1950, Goss; Colonia, Mar. 1949, Maehler; Tomil Distr., July 1950, Goss.

CAROLINE ATOLLS. Eight. ULITHI: Falalop I., Oct. 1952, Krauss. SATAWAL: Feb. 1953, Beardsley. KAPINGAMARANGI: Werua I., Aug. 1954, Niering. WOLEAI: Utegal I., July 1946, Townes. SONSOROL: Sept. 1952, Krauss.

TRUK. Two. TONOAS (Dublon): Dec. 1935, near sea level, Ono. FEFAN: May 1946, Townes.

PONAPE. Two, Colonia, July, Nov. 1949, 1953, Beardsley, Owen.

KUSAIE. Three, Mt. Fenkol, Jan. 1953, Gressitt; Lele I. (Lalu), 100 m., Feb. 1953, Clarke.

MARSHALL IS. Three. NAMORIK: Namorik I., Sept. 1953, Beardsley. KILI: Oct. 1953, Beardsley.

GILBERT IS. Three. TARAWA: Bairiki I., Nov. 1957, Krauss. BUTARITARI: Butaritari I., Dec. 1957, Krauss.

18. Pygophora boninensis Snyder, new species (figs. 12, *c*; 13, *a*, *b*).

Male: 5.7-6.0 mm. long. Head yellow, occiput and vertex fuscous; all parts gray pruinescent. Antennae yellow; palpi white. Antennal segment 3 ends above vibrissae and usually opposite the few setulae above them.

Thorax fuscous, bluish gray pruinescent; not vittate.

Legs fulvous, mid and hind coxae mostly fuscous, sometimes with fulvous streaks. *F1* with normal *pd* and *pv* bristles; and only a few short *av* setulae basally. *T1* with a distinct median *ad*, and usually one or two shorter ones basad and beyond; preapical *pd* shorter than preapical *d*, *p*, and *pv*. *F2* with a complete row of very short, but somewhat strong, *av* setae, a row of *v* to *pv* bristles which are about 2.0 times as long as *av* and with two to four much longer *pv* which are as, or slightly longer than, *F2* height where situated (fig. 13, *a*, *b*). *T2* with a median *p* to *pd* and a shorter one basad. *F3* with a complete row of irregular *av* subequal to *F3* height; two very long *pv* on basal 0.25 and

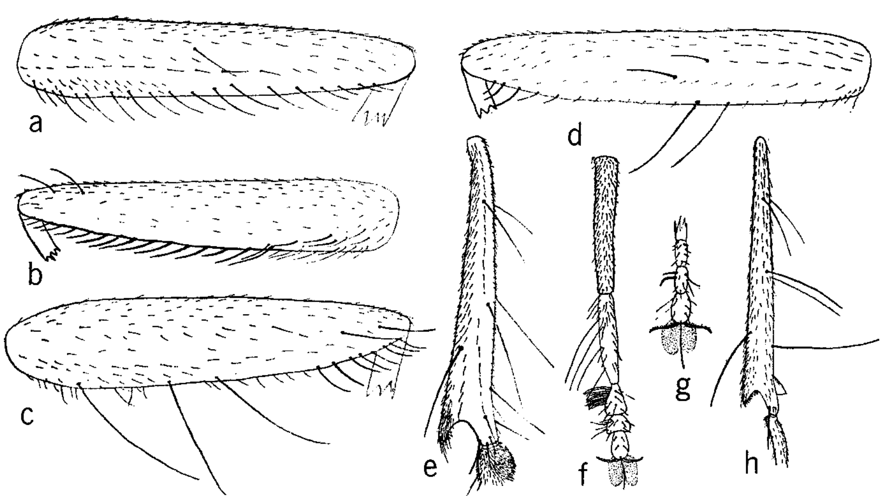


FIGURE 13.—**a-d**, Mid femur, male: *a*, *Pygophora boninensis*, anterior surface; *b*, *P. boninensis*, posterior surface; *c*, *P. palauensis*, posterior surface; *d*, *P. palauensis*, anterior view. **e**, *P. yapensis*, *T3*, anterior view; **f**, *P. tarsaseta*, hind tarsus, dorsal view; **g**, *P. tarsaseta*, fore tarsus, dorsal view; **h**, *P. lobata*, *T3*, anterior view.

a row of very short ones beyond them; a single *pd* about midway between the two terminal ones in the *ad* row. *T3* notched or toothed apically; with two *ad*, two *pd*, an *av* on apical 0.25-0.33, a weak median *pv*, a longish *d* on apical 0.1 and a strong apical *av* and shorter *ad* and *pd*; latter bristle with two or three short upright setulae before and beyond it; "tooth" slightly shorter than that portion of tibiae beyond base of notch; and with a terminal clump of very short spinules. Tarsi not unusually modified.

Wings hyaline, not unusually bristled on costa or along posterior margin. With a diffuse, light-brown spot at apex of second vein which is dark in mature individuals and very light or completely absent in teneral ones. Calyptrae white; halteres yellow.

Abdomen with tergites 1 and 2 yellow, and 2 with a brownish median spot; 3 fuscous above and with a variable part of sides yellow to fuscous, dorsum with three extensive seal-brown spots; 4 fuscous, though sometimes with limited fulvous streaks on sides, dorsal keel seal brown and bristled as in figure 12, *c*.

Female: 5.7-6.0 mm. long. Antennae fulvous and shorter than in male. Thorax with traces of a median brown line and often another in planes of *dc* bristles.

Leg color variable from faint brown shadows at base of femora and brownish tarsi to fuscous on basal 0.5-0.8 of *F* and extensive brownish streaks on *T*. *F1* with three to five distinct *v* to *av* bristles at base. *T1* with two subequal *ad*. *F2* with *av* less numerous, somewhat longer than in male but all are shorter than *F2* height where situated; two *a* bristles near middle, and with three long *v* bristles on basal 0.5. *T3* not toothed; the preapical *d* not quite so long as hind metatarsus and with much shorter setulae adjacent to preapical *pd*.

Wings without a trace of a brownish apical shadow.

Abdomen fuscous; gray pruinescent. Tergites 1 and 2 with a narrow apical yellow to fulvous band dorsally; the sides with a variable portion lighter colored. Dorsum of tergite 1 with a median brown spot; 2 and 3 with two longish brown spots; and tergite 4 with two.

Holotype, male (US 67167), allotype, female (US), 48 male, 43 female paratypes (US, BISHOP), Bonin Is., Chichi Jima, Omura, May 5-June 9, 1958. Additional paratypes: male, Okumura, "Yankee Town," Apr. 8-15, 1958; two females, May 12-June 9, 1958; female, Miyanohama, "Jack Wms Beach," Apr. 15-21, 1958; Chichi Jima: two females, Ani Jima, Sen-zan (N.E. bay), May 28, 1958, all Snyder; female, Nishi Jima, May 22, 1958, Snyder and Mitchell; male, Chichi Jima, Aug. 10, 1951, Bohart.

DISTRIBUTION: Bonin Is. (Chichi Jima).

All the specimens from Omura were collected on leaves of mountain banyan and *Hibiscus* spp. in the late morning (9 to 11:30 a.m.) during the many days noted on the labels; at other times of the day on the same trees no flies could be found. This vegetation was along the sides of an abandoned road 30 to 100 m. above sea level. Specimens from other localities were very teneral and taken when sweeping grass.

Considerable variation exists in the 93 specimens from the holotype locality. The dark preapical spot on the male wing is absent on all very teneral specimens, usually faint to distinct in older ones, and very prominent in very old ones as indicated by slightly frayed wing margins; a few specimens have a very faint brownish dorsal shadow at tip of *F3*. The extent of the variable fuscous to light color of the abdomen in the female is not obviously associated with the age of the specimen when taken.

This species traces to *nigricauda* Bigot in Malloch's key (1922, Ann. Mag. Nat. Hist. IX, **10**: 381). The late Dr. F. I. van Emden kindly examined the paratype specimen from Chichi Jima, taken in 1951 by Bohart, and did not consider it conspecific with the type of *nigricauda* because of the different arrangement of the *av, v,* and *pv* bristles on *F2* in the two species. Dr. van Emden considered the type of *nigricauda* to be a synonym of *macularis* Wiedemann, and Malloch's Ceylon specimens of *maculipennis,* which were used for his key, to be actually *nigricauda* and to fit that alternative in Malloch's key if the word "long" is omitted.

19. Pygophora yapensis Snyder, new species (figs. 12, *a*; 13, *e*).

Male: 6.0-6.4 mm. long. Generally similar to *lobata* but differs in having occiput gray; remainder of head densely fulvous yellow pruinescent.

F1 with four or five widely spaced *pd* bristles on apical 0.60 and without a ventrally situated basal row; *pv* series longer and without as numerous long, interspersed setulae; with fewer, but longer basal *v* to *pv* bristles. *T1* with two short, but distinct *ad* bristle-like setulae on basal 0.5. *F2:* only one or two *av* bristles at middle, though the entire *av* surface bears conspicuously short, widely separated setulae; three long, median *pv* and, five to seven closely placed *pv* setulae on apical 0.20; the apical bristles in the two *a* rows well developed. *F3:* three long *av* on basal 0.25 and three shorter ones on apical 0.25; only five or six widely separated *av* bristles on median 0.50; one *v* to *pv* on basal 0.33. Mid coxal bristles somewhat stouter than in *lobata*. *T3* with three short *pv* bristles on apical 0.67 (fig. 13, *e*).

Abdomen yellow, segment 3 with a median, apical dark triangle and dorsal apical portion of 4 as well as the entire basal hypopygial segment fuscous. Sides of tergite 4 with very long, but sparse bristles, the apices of which are outwardly and slightly upwardly directed. Basal hypopygial segment with an irregular double row of long, laterally directed, sparsely distributed bristles (fig. 12, *a*). Fringe of hairs on inner basal portion of superior forceps much longer and more "tufted" than in *lobata*.

Female: 6.0-6.7 mm. long. Similar to male except *F* are partly or mostly fuscous. Legs are bristled as in females of *lobata* except for characters mentioned in key. Abdomen is generally colored as in females of *lobata*, and as in that species, there is no abdominal keel or carina.

Holotype, male (US 67168), Yap I., Yap, Mt. Matade, 60 m., Dec. 2, 1952, Gressitt. Allotype, female (US), Yap I., Oct. 1952, Krauss. Paratypes (BISHOP, US): male, female, same data as allotype except Sept. 1952; female, S. Map I., July, Aug. 1950, Goss.

DISTRIBUTION: Caroline Is. (Yap).

20. **Pygophora palauensis** Snyder, new species (fig. 13, *c, d*).

Male: 5.4-5.6 mm. long. Head fuscous, cheeks, face, and front yellow pruinescent; frontal vitta darker and posterior part of parafrontals grayish pruinescent; back of head grayish pruinescent. Parafrontals bristled as in *tarsaseta*. Front at vertex 0.19-0.20 of head width, broadened to 0.31-0.33 at base of antennae. Antennae, including arista, fulvous; inserted opposite dorsal 0.43 of eyes and ends opposite their lower margin. Palpi white.

Thorax fuscous, gray pruinescent; unmarked.

Legs yellow, mid and hind coxae fuscous, but with fulvous streaks. *F1* normal. *T1* with two very short *ad* on the median 0.5. *F2* with two *av* and two *pv* long bristles at middle, and a group of four to six short, closely placed *av* setae on apical 0.2, none of which are quite so long as diameter of *F2* where situated; and with two *a* near middle and a long and a short preapical *p* (fig. 13, *c, d*). *T2* with two median *p*. *F3* with a row of widely spaced *av* bristles and a very long basal *v*. *T3* as in *lobata*, except U-shaped incision is broader and tooth slightly longer. Tarsi normal.

Wings hyaline; a brownish cloud at apex of second vein and a shadow along apex of third vein; these are more or less confluent. Venation and posterior margin as in *lobata*. Calyptrae white; halteres yellow.

Abdomen with basal three segments yellowish; 2 with a small median brown apical spot; 3 with three large subconfluent ones; 4 densely bluish gray pruinescent, with three large dark fuscous brown spots, median one extending over dorsal keel.

Female: 6.1-6.2 mm. long. Face, and entire parafrontals gray pruinescent. Antennae shorter and with darker fulvous apical shadows on segment 3. Head otherwise as in male. Thorax with narrow indistinct dark vitta in *dc* plane.

Legs fuscous, trochanters, knees, *T1*, and *T2* fulvous; *T3* fulvous to fuscous. Bristled as in male except *F2* with one long median *av*, and a row of shorter ones basad; clump of apical *av* shorter and scarcely distinguishable. *F3* with three long *v* on basal 0.5. *T3*

not notched apically; preapical *ad, d, pd,* and *av* bristles long; *d* is longest but is shorter than length of hind metatarsus.

Wings unmarked, hyaline.

Abdomen fuscous; apical margins of tergites 1 to 3 pale, and with a yellowish to fulvous area on sides and middle of dorsum of segment 1; segments 2 and 3 with two large round fuscous spots and a narrow median one; and a single large spot on each side of 4; remainder of tergites with dense, bluish-gray pruinescence.

Holotype, male (US 67169), Palau Is., Babelthuap I., Ngiwal, May 21, 1957; allotype, female (US), Malakal I., May 2, 1957, Sabrosky. Paratypes (BISHOP, US): Babelthuap I., female, Airai, Ngarsung, May 16, 1957; female, Ngerehelong, May 7, 1957, all Sabrosky. Koror, male, Mar. 15-24, 1948, Maehler.

DISTRIBUTION: Caroline Is. (Palau).

21. **Pygophora edgari** Snyder, new species (fig. 12, *h*).

Male: 4.5 to 4.9 mm. long. Yellow to fulvous in ground color except for fuscous postocellar spot and ventral margin of occiput, white palpi, and hyaline wings which are faintly tinged. Bristles and clothing hairs on body and appendages black to fuscous. Body gray pruinescent.

Head: Front at vertex 0.19 of head width, broadened to 0.32 at base of antennae. Frontal triangle extends midway between strong anterior and short posterior pair of reclinate bristles on posterior 0.5 of parafrontal. Anterior of two pairs of parafrontals on anterior 0.5 slightly more than twice length of pair behind them. Anterior ocellars subequal to weak posterior pair of reclinate parafrontals; with an irregular double row of postocular setae. In profile, cheeks subequal to width of antennal segment 3. Antennae inserted opposite dorsal 0.37 of eyes and terminate slightly above their lower level; segment 3 three times as long as 2.

Thorax: two to four irregular rows of *ac* setulae; anterior *presut* accessory *dc* setula not differentiated; *ia* 2. Scutellum with subbasal and apical bristles equal, and the three to eight clothing setulae confined to dorsum.

F1: three to five *pd* bristles on apical 0.5; and an almost complete row of *p* which on basal 0.5 are about as long as *pd* series, but remaining *p* become shorter apically and are scarcely longer than adjacent sparse, longish clothing setulae; a complete row of five to eight long, slender *v* to *pv* bristles; and three to five shorter *a* to *av* on basal 0.33 to 0.50; all clothing setulae sparse, slender and moderately long. *T1:* two short *ad* and one long median *p* bristle; apical *d* subequal to median *p,* and apical *pd* and *p* about 0.5 its length; other apicals not differentiated, or if present then shorter than *T1* diameter. Mid coxae very slightly tuberculate, each with two long, strong, closely placed, posteriorly directed bristles. *F2:* a median *a* bristle and another somewhat more ventrally situated one just beyond; four to six *v* on basal 0.5; two apical *p*. *T2:* two *p* on median 0.5; the apical *ad, pd* and *v* long and strong, about 0.5 as long as mid metatarsus; apical *a* and *p* bristle about 0.5 this length; other apicals not longer than *T2* diameter. *F3:* five to nine widely spaced *av* bristles which are longer than *F* height, and a few much shorter *pv*; preapical *pv* longer and stronger than others. *T3:* an *ad* and *pd* at middle and on basal 0.33, mid *d* bristle situated at apical 0.5 and about as long as basal subapical *ad* bristles; *pv* surface with four widely separated short bristles from basal 0.25 to apex, and a submedian *av*; apex of *T3* not notched.

Wings unspotted; costal setulae and fringe along posterior margin not conspicuous.

Abdomen in profile with a strong apical dorsal keel as in *lobata* Stein, sides of tergite 4 and basal hypopygial segment with numerous short, dorsally curved spines which are shorter than those in *lobata.* The apical fringe of bristles on ventral margin of segment 4 slender and not unusually conspicuous. Processes of sternite 5 with a deep V-shaped notch at middle of posterior margin (fig. 12, *h*).

Female: 4.7 mm. long. Similar to male, but with an incomplete dark median abdominal vitta which is overlaid with dense gray pruinescence. Abdomen with traces of two round, subshiny, brown spots on second visible tergite, three distinct spots on tergite 3, and two on 4. Bristles in *p* row on *F1* shorter than *pd* bristles. *F3* with only preapical bristle on *pv* surface.

Holotype, male (CM), Saipan I., S. Mariana Is., 1.6-3.2 km. east of Tanapang, Nov. 21, 1944, Dybas; allotype, female, Saipan I., Marianas, Mt. Tagpochau, 1 mile NNE of summit, Nov. 24, 1944, Edgar. Paratypes (CM, US, BISHOP): Three males, Saipan, As Mahetog area, at light, Nov. 18, Dec. 28, 1944, Edgar; male, same data as type; male, Agiguan I., Mariana Is., Aug. 7, 1954, Davis.

DISTRIBUTION: S. Mariana Is. (Saipan, Agiguan).

The head of the allotype is badly crushed and other parts, except legs, are similarly damaged, but the differences between female and male noted in the description are clearly visible. The male paratype from Agiguan was in alcohol and was subsequently mounted on a minutem; on drying it exhibited several asymmetric dark discolorations on thoracic and abdominal dorsum. Because it was the most mature and easily dissected specimen, it was used for illustration of the genitalia.

22. **Pygophora alaseta** Snyder, new species (figs. 3, *c*; 12, *e*).

Male: 3.4 to 3.6 mm. long. Head except occiput yellow; pruinescence on face and front pale to deep yellow, and on cheeks gray to yellow. Occiput mostly dark, densely gray pruinescent, lower margin of the dark portion variable, extending from lower level of eyes to ventral margin; usually with a small yellowish postvertical area. Head slightly wider than high. Front at vertex 0.23 to 0.24 of greatest head width, widened to 0.35 at base of antennae; face 0.46 of head width at level of vibrissae. Antennae yellow; palpi white to yellow white. Proboscis shiny brownish fulvous. Anterior of two posterior pair of reclinate parafrontal bristles 0.67 to 0.75 as long as strong anterior, convergent pair on anterior 0.5 of parafrontals; posterior reclinates about 0.33 length and strength of anterior reclinate, and scarcely longer than anterior ocellar bristles.

Thorax black, yellowish gray pruinescent; with traces of a dark median vitta, and another in *dc* planes; *ac* 0:0, the *ac* setulae sparse, and in two closely placed, somewhat irregular rows; without a well-defined accessory anterior *presut dc* setula.

Legs yellow to fulvous yellow; bristles black. *F1:* three *pd* on apical 0.5 and four or five widely spaced *pv* beyond a group of three to four closely placed basal bristles. *T1:* one to three very short *ad* on median 0.5, one very long *p* to *pv,* a long preapical *d,* and preapical *p* and *pv* bristles. *F2:* with a median *ad,* beyond which is an *a,* and three widely spaced *av* on basal 0.67; two *v* to *pv* on median 0.5, and a group of shorter and closely placed *v* on basal 0.25; and a single long preapical *p* bristle. *T2* with one short median *p* to *pd. F3:* two to four long *av* bristles on apical 0.20 to 0.25, basad with series of irregular hairs which are 0.3 to 0.5 as long as diameter of *F3* where situated; clothing setulae from basal 0.33 to apical 0.20 of lower *a* surface appressed but upwardly directed; *ad* row of 6 to 10 bristles outwardly (anteriorly) directed; without distinct *pv* bristles. *T3:* numerous long *av* to *v* hairlike bristles on basal 0.33 which are longest near base and become shorter at middle; two *av* beyond above clump; a short subbasal *ad,* a longer submedian *ad* and a long *d* on apical 0.25 to 0.20 and a slender submedian *pd*; a weak apical mid *d* and a strong *av.* Mid coxae each with two very closely placed, long, posteriorly directed bristles. Tarsi normal.

Wings hyaline; with a brownish spot as in figure 3, *c*. Apical section of fifth vein extremely short. Fringe of hairs along posterior margin of wings about 0.33 to 0.50

as long as anterior cross vein and usually directed dorsally at right angles to upper plane of wing.

Abdomen preapically compressed, yellow to pale fulvous. subshiny and with sparse grayish pruinescence which becomes more distinct posteriorly. With a pale, subshiny brown, interrupted median vitta on visible tergites 2 to 4, and with a larger and more distinct brownish spot on each side of this vitta on tergites 3 and 4. Tergite 4 with a very slight apical median dorsal ridge or carina laterad of which there is a single, moderately long, posteriorly directed bristle; setulae on dorsal 0.33 of sides of tergite 4 rather short, curved, and posteriorly directed; with a fringe of moderately long hairs along posterior margin below. Hypopygium as in figure 12, *e*.

Female: 3.8-4.7 mm. long. Similar to male but differs in having shorter bristles on ventral surfaces of *F2*; *T2* with two *p* bristles; with normal appressed posteriorly directed clothing setulae on apical portion of *F3*; without a clump of *v* bristles at base of *F3* and without basal group of *av* to *pv* bristles on *T3*.

Spot at apex of second wing vein much reduced or absent; apical section of fifth vein reaches almost to wing margin; without prominent fringe of long hairs along posterior margin.

Abdomen less shiny, with three long brown spots on tergites 2 to 4. Without a median keel or carina and with normal bristles and clothing setulae.

Holotype, male (US 67170), allotype, female (US), 11 male, 16 female paratypes (US, BISHOP), Yap I., Yap, Carolines, Aug., Oct. 1952, Krauss; paratypes: five females, topotypical, Aug.; two females, Yap I., Mar. 28, 1954, Beardsley; female, Ruul, nr. Kolonia, June 13, 1957, Sabrosky; Rumung I., Oct. 22, 1952, Krauss.

Additional records: Three females, S. Map I., Yap, July-Aug. 1950, Goss.

DISTRIBUTION: Caroline Is. (Yap).

The venation and the long hairs along posterior margin of wing will separate males of this species from all other *Pygophora.*

23. **Pygophora tarsaseta** Snyder, new species (fig. 13, *f*, *g*).

Male: 5 mm. long. Head dark; face and cheeks yellow to yellowish gray pruinescent. Front fulvous pruinescent, vitta dark. Back of head grayish pruinescent. Front at vertex 0.14 to 0.15 of head width, broadened to 0.29 at base of antennae. Parafrontals with two pairs of convergent bristles on anterior 0.5, anterior pair strongest; and with two pairs on posterior 0.5 which are backwardly directed, posterior pair are shorter than others and subequal to anterior ocellars. The fulvous antennae and arista are inserted opposite middle of eyes and end distinctly above their lower margin and oral margin. Palpi white.

Thorax fuscous, densely gray pruinescent; unmarked.

Legs yellow except mid and hind coxae, former mostly fuscous with dense gray pruinescence and latter with limited fulvous streaks, underneath dense gray pruinescence. *F1* normal. *T1* with two short *ad* setae and without upright *ad* clothing setae. *F2* with two *av* bristles on basal 0.5, and two *pv* to *v* near middle; and two submedian *a*, the more dorsal one distinctly more basally situated than the other; a single apical *p*. *T2* with two short *p* on basal 0.5. *F3* with five widely spaced *av*, a long *v* to *pv* on basal 0.33, and some short setae on apical 0.33. *T3* with usual bristles on dorsal surfaces longer than usual, and preapical *ad*, *d*, and *pd* as long as, or longer than, basal two hind tarsal segments (fig. 13, *f*). Fore tarsal segment 4 with two conspicuous straight, anterior setae and one or two shorter *p*, one of which has the tip bent apically (fig. 13, *g*). Mid tarsi normal. Hind tarsi with longish *p* hairs on segments 2 and 3 (fig. 13, *f*).

Wings hyaline. Calyptrae white; halteres yellow.

Abdomen yellow, gray pruinescent, with indications of a median spot and an additional pair on tergites 2 to 4 inclusive; tergite 4 with a slight, median carina, and without conspicuously differentiated long or short clothing setulae on sides.

Female: 5.8 mm. long. Head as in male but face, frons, and antennae more brownish fulvous. Thorax with narrow median *ac* and *dc* vittae; anterior mesopleural setula present adjacent to the anterior *ntpl.* Femora fuscous except at base and apex. The preapical *d* bristle very long and conspicuous on *T3.* Tarsi not unusually modified. Abdominal tergites 2 and 3 with a large dark band which is gray pruinescent; and three dark spots, the base and apex of these, as well as tergite 1, fulvous.

Holotype, male (US 67171), Palau Is., Ngaiangl A., May 9, 1957, Sabrosky; allotype, female (BISHOP 3556), Angaur I., Mar. 1954, Owen and Beardsley.

DISTRIBUTION: Caroline Is. (Palau).

The single male lacks a conspicuously weak anterior mesopleural setula adjacent to the anterior *ntpl* bristle. A longer series of males will be necessary before the significance of this character can be evaluated.

24. **Pygophora kusaiensis** Snyder, new species (fig. 12, *b*).

Male: 5.8-6.2 mm. long. Head black; face, front, and cheeks fulvous yellow pruinescent; occiput grayish pruinescent. Antennae yellow. Palpi whitish yellow. Mentum shiny fuscous.

Thorax black, bluish to faintly yellowish gray pruinescent; with a narrow but distinct dark vitta along planes of *dc* bristles. Bristled as in *alaseta* but with a pair of short accessory *presut dc* setae.

Legs fulvous except fuscous mid and hind coxae. *F1:* several irregular rows of closely placed long, slender *pd* bristles on 0.33; otherwise normal. *T1:* a short slender median *p* bristle, and three or four very short *ad* setulae. Mid coxae without apical thorns but each with two long, slender curved bristles which are scarcely distinguishable from adjacent bristles. *F2:* one strong median *a* bristle, two long median basal *av* and some shorter, more slender ones apically; a double row of four or five strong *pv* bristles at median 0.33, beyond which are some shorter and more irregularly placed bristle-like setulae; a row of 6 to 10 very closely placed, short setulae on apical 0.12 which are as long as height of *F2* where situated. *T2:* two *p* to *pd* on basal 0.5. *F3:* four to six long, widely spaced *av* bristles, between which are numerous interspersed short setulae; a long basal and median *v* to *pv* bristle and numerous long setulae; a single row of short *av* setulae on apical 0.5 which are about equal to diameter of *F2* where situated; a row of 8 to 10 short, almost thornlike bristles on basal 0.16 of *p* surface which extend obliquely from *pd* to *pv* surfaces. *T3* with two *ad* and *pd* bristles on basal 0.5, a preapical *d* and an *av* on apical 0.33; *pv* surface bare. Tarsal claws and pulvilli large; claws fringed with long, fine hairs.

Wings hyaline, with a faint yellowish-brown tinge. Third and fourth veins parallel to slightly divergent at apex. Anterior cross vein inserted slightly beyond middle of discal cell.

Apical section of fifth vein reaching almost to wing margin, and about 0.8 as long as posterior cross vein. Fringe of clothing setulae along posterior margin somewhat longer than usual, but not as distinct or as upright as in *alaseta.*

Abdomen not noticeably compressed and without a dorsal carina; fuscous yellow; tergites 3 and 4 with three dark-brown spots. Tergite 4 with a single pair of long, posteriorly directed bristles at apex. Basal hypopygial tergite slightly swollen or globular above, and bears a pair of strong dorsal bristles (fig. 12, *b*); its pleura and that of tergite 4 with widely separated slender clothing setulae which are similar to those on the sides of other tergites; a row of four or five strong posteriorly directed bristles along the lower posterior margin of tergite 4. Processes of sternite 5 enlarged, rounded and semitransparent, fulvous brown. Inner margin of superior forceps with a fringe of closely placed black hairs.

Holotype, male (BISHOP 3557), Kusaie I., Mutunlik (Yepan), Jan. 23, 1953, light trap, 16 m., Gressitt; paratype (US): male, same data as type; male, Kusaie, Lele I., 100 m., Feb. 18, 1953, Clarke.

DISTRIBUTION: Caroline Is. (Kusaie).

This species is probably allied to *P. ctenophora* Bezzi from Fiji and *P. buxtoni* Malloch from Samoa. It differs from the former in lacking "stripe of dense microscopic black hairs on each side of the fourth abdominal tergite." From *buxtoni* it differs in having the *p* bristle on *T1* not long and curled; with one, not two, series of *pv* setulae near apex of *F2*; with more than four *p* bristles at base of *F3*; *T3* without three *ad* and six *pd* bristles; and without a faint apical costal cloud on wings.

25. Pygophora mariana, Snyder, new species.

Male: 3.5-4.2 mm. long. Head as in *alaseta* but yellow areas on cheeks and occiput less distinct. Thorax colored and bristles as in *alaseta.*

Fore and mid legs as in *alaseta* except *F2* with two preapical *p*. *F3* with normal upright row of *ad* bristles, and normal clothing setulae; the four or five widely spaced *av* bristles subequal; without *v* or *pv* bristles. *T3* with a prebasal *ad* and *pd,* a median *ad* and *pd*; a preapical mid *d* and an *av* at apical 0.33; without *pv* bristles, but a few of the clothing setulae on apical 0.20 slightly longer than usual.

Abdomen colored as in *alaseta* but with a prominent median dorsal ridge which bears three to five pairs of long, slender, posteriorly directed bristles; sides of segment 4 with more numerous, but shorter and stronger setulae which are dorsally or outwardly directed. Basal hypopygial segment with longer and more numerous bristles and clothing setulae.

Female: 3.7-4.0 mm. long. Similar to male and to females of *alaseta.* Differs from male in usual sexual abdominal characters. Wings unspotted. *F3* with two long, strong *v* bristles on basal 0.25. *T3* without longer preapical *pv* clothing setulae. Also as noted in key.

Holotype, male (US 67172), Yona, Guam, S. Mariana Is., Oct. 1952, Krauss; allotype, female (US), Agana, Guam, Oct. 1952, Krauss; paratypes (US, BISHOP, CM), female, Guam: Upi Trail, May 5, 1936, Bryan; female, Guam: Pago Bay, June 2, 1945, Dybas; male, female, Tinian I., Nov. 11, 1952, Beardsley; female, Guam: Yigo, Oct. 1957, Krauss; male, Saipan, Jan. 14, 1949, Maehler.

DISTRIBUTION: S. Mariana Is. (Guam, Tinian, Saipan).

This species is similar to the Australian *P. aliena* Malloch (1922, Ann. Mag. Nat. Hist. IX, **10**: 380-382) but that species has the entire ventral margin of fourth tergite with several rows of closely placed, long, slender, bristly hairs which become longer toward the apex of the ventral surface. The *pv* bristles of *T3* in *aliena* are arranged with two on the apical 0.33 and one at the apex.

26. Pygophora oakleyi Snyder, new species (fig. 12, *g*).

Male: 4.3 mm. long. Head with face, frons, and cheeks pale; yellowish white pruinescent. Back of head fuscous, gray pruinescent. Antennae fulvous, inserted opposite dorsal 0.42 of eyes and terminate slightly below their lower margin, and almost at the oral margin; segment 3 is 3.6 times as long as 2. Palpi yellow.

Thorax yellowish fulvous, dorsum fuscous except humeri and notopleura; not vittate.

Legs entirely fulvous yellow. *F1* normal. *T1* with two very short *ad* hairs on median 0.5. *F2* with a long median *v* to *pv*; a few very short slender *av* on basal 0.5; two median *a*; and two preapical *p*; without distinctive *av* or *pv* preapically. *T2* with two *p* on basal 0.5. *F3* with about four widely spaced *av*, and a long median *pv* to *v*. *T3* with a longish preapical *d*, a shorter more apically placed *ad*; apical *pd* much shorter than others; *p* to *pv* surfaces with about 10 of the clothing setulae on the apical 0.1 to 0.2 longer, stiffer, and more upright than usual, but not quite so long as tibial diameter; and one to three slightly longer *pv* on median 0.5. Tarsi normal.

Wings hyaline, very faintly tinged and with a brownish cloud at apex of second vein, the spot extends posteriorly to third vein. Calyptrae white; halteres yellow.

Abdomen yellow with very sparse pruinescence. Tergites 3 and 4 with three large dark brown spots, and with a lighter one at middle of large basal hypopygial segment. Dorsal keel present on 4; clothing setulae on sides of it and basal hypopygial segment are upright and slightly curved; not numerous or closely placed (fig. 12, *g*). In profile sternite 5 with a reverse L-shaped lateral process.

Holotype, male (US 67173), Lele I., Kusaie, Aug. 19, 1946, Oakley.

DISTRIBUTION: Caroline Is. (Kusaie).

As the single specimen appears to have been preserved in fluid before mounting, the exact color, as well as the extent of the infuscation on the thoracic dorsum, is difficult to determine.

27. **Pygophora minuscula** Snyder, new species (fig. 12, *d*).

Male: 3.5-4.2 mm. long. Head: black, pruinescence of face and anterior portion of front fulvous to yellowish gray; posterior part of front grayish brown; occiput gray. Antennae elongate, bright fulvous yellow. Palpi white.

Thorax black, grayish pruinescent with scarcely distinguishable vittae; bristled as in *alaseta*.

Legs fulvous; fore and mid coxae slightly grayish pruinescent. Fore legs as in *alaseta*. Mid coxae with two closely placed, stout, posteriorly directed spines. *F2* without stout bristles on *v* surfaces, but with two weak, submedian *a* bristles and two preapical *p*. *T2* with two *p* bristles. *F3* with four to five widely separated, rather short *av* bristles. *T3* with two *ad* and two *pd* bristles on basal 0.5; an *av* on apical 0.5; a long preapical mid *d*; and an irregular row of six to eight short *pv* bristles on apical 0.75, those toward base longish and those near apex stubby, irregular, and closely placed.

Wings hyaline but with a faint to dark shadow at apex of second vein. Anterior cross vein situated distinctly apicad of middle of discal cell. Ultimate section of fifth vein reaches wing margin. Third and fourth veins subparallel, their apices not curved posteriorly. Posterior margin of wing without long, conspicuous setulae.

Abdomen compressed apically; tergites 3 and 4 largely blackish, gray pruinescent, and with three dark spots. Bristled as in figure 12, *d*. Processes of sternite 5 evenly rounded apically and semitransparent.

Female: 3.5-4.2 mm. long. Head similar to male, but antennal segment 3 shorter and pruinescence on face more gray than yellowish gray. Palpi yellowish white.

Femora and coxae fuscous except for knees of former and variable streaks on latter; remainder of legs yellow. *F2* with three strong *v* on basal 0.5 to 0.6, and mid coxae without prominent thornlike bristles. *T3* without *pv* row of setae. Otherwise legs as in male.

Wings hyaline, without dark shadows.

Basal two abdominal segments yellow, sometimes base and apex of segment 3 similarly colored; 2 and 3 with three large dark spots which are often confluent on 2, but usually separate on 3; 4 with a pair of dark subquadrate spots and often a faint median dark streak.

Holotype, male (BISHOP 3558), Koror, Palau Is., Nov. 1953, at light, Beardsley; allotype, female (US), topotyp., Apr. 29, 1957, Sabrosky; paratypes (US, BISHOP, CM); five males, topotyp., Aug. 28, 1952, Jan. 12, 1953, at light, Beardsley; Dec. 4, 1947, Dybas; Feb. 17, 1936, Esaki; male, S.W. Koror, 25 m., Dec. 5, 1952, light trap, Gressitt; male, Babelthuap I., Ngardmau, May 10, 1957, Sabrosky; five females, Palau Is., Malakal I., May 2, 1957, Sabrosky; female, Ngarmalk, Apr. 23, 1957, Sabrosky; female, Babelthuap I., Ngerehelong, May 7, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

Genus **Atherigona** Rondani

Atherigona Rondani, 1856, Dipt. Ital., Prodr. **1**: 97.—Malloch, 1923, Ann. Mag. Nat. Hist. IX, **12**: 177; 1924, ibid. **13**: 410; 1925, Mem. Dept. Agric. India, **8** (11): 111, 119; 1928, Ent. Mitteil. **17**: 297, 311; 1929, Insects of Samoa **4** (3): 157; 1932, B. P. Bishop Mus., Bull. **98**: 200; 1935, Federated Malay States Mus., Jour. **17**: 646; 1936, ibid **17**: 154.—Huckett, New York Ent. Soc., Jour. **44**: 19.—van Emden, 1940, Ruwenzori Exped., **2** (4), Muscidae B: 97.

Acritochaeta Grimshaw, 1902, Fauna Hawaiiensis **2**: 41.—Stein, 1911, Archiv Naturgesch. A, **77**: 145.—van Emden, 1940, op. cit., 105.

Atherigona (*Atherigona*) Hennig, 1952, Beitr. zur Ent. **2**: 64.

Atherigona (*Acritochaeta*) Stein, 1913, Mus. Nat. Hungarici, Ann. **11**: 530. —Huckett, 1934, New York Ent. Soc., Jour. **44**: 190.—Hennig, 1952, op. cit., 62.

Head almost square to subrectangular in profile (fig. 4, *c*); front broad in both sexes. Parafrontals with a single strong posterior reclinate bristle on each side, and with several short anterior ones. Antennae large and prominent; segment 3 at least three or more times as long as 2. Arista bare. The *dc* bristles scarcely differentiated from *ac* and other clothing setulae except posterior *postsut* pair of *dc* which are sometimes short but distinct.

Two or three divisions exist in this group as Stein, Malloch, and van Emden have discussed. The larvae of *Atherigona, s. str.,* so far as known, are phytophagous, boring in stems of grasses or *Rawsonia* (van Emden, 1940, op. cit., 102) and may be of economic importance. Adult males are readily recognized by the characteristic trifoliate processes, and hypopygial prominence of the genitalia (fig. 1, *h*). The palpi are small, often subclavate, and bear longish hairs basally (fig. 14, *b*), females have relatively small palpi which are usually distinctly curved, being sickle- or scythe-shaped (fig. 14, *a*).

The larvae of the second group, *Acritochaeta,* are usually predacious or scavengers in decaying organic matter. Although numerically smaller in species than *Atherigona, s. str.,* members are more diverse structurally and at least four subgroups are known. Three of these are present in the Micronesian material.

The group *Acritochaeta* can best be defined as species of *Atherigona, s. lat.,* in which males lack the trifoliate processes and a hypopygial prominence and both sexes have relatively large and scarcely curved palpi (fig. 14, *c-e*). In typical *Acritochaeta,* the male fore femora are strongly constricted dorsally between the middle and the apex (fig. 15, *a-c*). Atypical *Acritochaeta* in Micronesia, *dybasi* and *pottsi* (fig. 15, *g*), have the male fore femora normal and in *dybasi* have very prominent male genitalia and much modified abdominal shape (fig. 1, *i*) as well as *st* 2 : 2.

The fourth subgroup, not so far known from Micronesia, has *F1* without a *d* constriction, also lacks the preapical *pv* bristle on this segment and has the *st* 1 : 1.

Atherigona, s. lat., is very abundant in specimens and species throughout the Old World tropics. Until the many undescribed species are elucidated, generic or infrageneric names are not used for the several groups within this segregate.

Key to Micronesian Species of Atherigona

MALES

1. *F1* with a preapical to submedian *d* excavation (fig. 15, *a-c*)....2
F1 normal, not dorsally excavated (fig. 15, *d*)....5

2(1). *F1* without a preapical *pv* bristle; thoracic pleurae entirely fulvous and covered with dense golden pruinescence....3
F1 with a short but conspicuous preapical *pv* bristle; thoracic pleurae mostly or entirely fuscous, and covered with grayish pruinescence....4

3(2). Antennal segment 3 mostly fulvous; thoracic dorsum not vittate; fore tarsi with long, fine *a* and *p* hairs (fig. 15, *h*); wings hyaline....**28. longipalpis**
Antennal segment 3 entirely fuscous; thoracic dorsum trivittate; fore tarsi with only the normal *a* and *p* setulae; wings with a brownish cloud in most of the marginal cell and extends posteriorly beyond second vein (fig. 3, *a*)....**29. trukensis**

4(2). Apical 0.1 to 0.2 of *F1* not darkened; palpi entirely yellow; ventral portions of enlarged abdominal tergite 2 with long pale hairs....**31. flavipalpis**
F1 entirely yellow to fulvous; palpi mostly or entirely darkened; only normal dark clothing setulae present on ventral portion of abdominal tergite 2....**30. excisa**

5(1). Palpi short, sickle-shaped, often with a clump of prebasal hairs (fig. 14, *b*); basal hypopygial segment tuberculate (figs. 1, *h*; 17); with a trifoliate process (figs. 1, *h*; 18; 19)....6
Palpi not sickle-shaped and without a clump of prebasal hairs (fig. 14, *f, g*); hypopygium without a tubercle or trifoliate processes....10

6(5). Abdomen shiny fulvous, with paired black spots; posterior 0.8 of parafrontals and back of head shiny black; hypopygial prominence with three small knobs (fig. 17, *a*); trifoliate process as in figures 16, *b*; 17, *a*; 18, *a*; 19, *a*)....**34. tobi**
Abdomen, parafrontals, and back of head not shiny, grayish to yellowish brown pruinescent; hypopygial prominence and trifoliate processes otherwise....7

7(6). Palpi entirely yellow, or if darkened then fuscous color confined to less than basal 0.33 8
Palpi mostly darkened, only apex, or not more than apical 0.4 yellow to white 9

8(7). Hypopygial prominence large, V-shaped (fig. 19, *e*) .... **35. oryzae**
Hypopygial prominence small and not V-shaped (fig. 19, *c*) .... **36. sabroskyi**

9(7). Hypopygial prominences and trifoliate processes as in figures 16, *e*; 17, *c*; 18, *d*; 19, *d*) .... **37. boninensis**
Hypopygial prominences and trifoliate processes as in figures 16, *d*; 17, *b*; 18, *b*; 19, *b*) .... **38. neoatripalpis**

10(5). *T1* with numerous long bristles and setulae on apical 0.67 of *pv* to *v* surfaces, usually (?) two of these longer and stronger than others; palpi yellow; in dorsal view abdominal tergite 1 longer than broad, entirely shiny brown; basal 0.5 of basal hypopygial segment shiny black; lower posterior margin of tergite 3 with several long strong bristles which are at least 0.5 as long as length of *F3* .... **32. dybasi**
T1 with only usual short clothing hairs; palpi dark; in dorsal view, abdominal tergite 1 broader than long; basal 0.5 of basal hypopygial segment not shiny black; lower posterior margin of tergite 3 with only normal clothing setulae, none of which are longer than maximum dorsoventral height of *F3* .... **33. pottsi**

FEMALES

1. Legs entirely fuscous or slightly brownish 2
Legs yellow to fulvous, in part or entirely 4

2(1). *F2* with two *a* bristles on basal 0.5; ventral apex of sternopleura with a conspicuous tuft of many short bristly hairs and a mat of very much shorter ones on anterior surface of mid coxae exclusive of row of closely placed marginal bristles; palpi mostly or entirely fulvous; thoracic dorsum with a transverse dark postsutural band .... **32. dybasi**
F2 without any *a* bristles; ventral apex of sternopleura with usual row of long bristly hairs only; anterior surface of mid coxae bare or with only a few short clothing setulae exclusive of marginal row of strong, scattered bristles; palpi entirely black; thoracic dorsum without a transverse dark band 3

3(2). Mesopleura with a brownish streak along dorsal and posterior margins; abdomen nowhere yellow to fulvous in ground color; calyptrae dark brown hyaline; setulae on sides and ventral surface of abdominal tergites 2 and 3 arise from distinct round brown spots, many of which are confluent .... **39. vita**
Mesopleura entirely grayish pruinescent; abdomen with a variable basal portion of tergites 1, 2, and often 3 yellow to fulvous in ground color; calyptrae white to pale brownish yellow hyaline; setulae on sides and ventral surfaces of abdominal tergites 2 and 3 not arising from round brown spots .... **33. pottsi**

4(1). Femora entirely black (go back to) 3
Femora partly or entirely yellow to fulvous 5

5(4). Antennal segment 3 mostly or entirely fulvous, at most with a dark dorsal apical shadow .... **28. longipalpis**
Antennal segment 3 entirely fuscous to fuscous brown or with at most a very limited basal fulvous streak near insertion of arista 6

6(5). Palpi narrow and distinctly curved (fig. 14, *a*) 9
Palpi usually longish, broad and only slightly curved (fig. 14, *c, e*) 7

7(6). Palpi entirely dark brown to fuscous .... **30. excisa**
Palpi fulvous to yellow on basal 0.6 or more 8

8(7). *F3* with one or two of the *av* clothing hairs at middle conspicuously longer than others; pruinescence of thoracic pleura and dorsum golden yellow .... **29. trukensis**
F3 without any of the median *av* clothing setulae conspicuously longer than others; pruinescence on thoracic pleura and dorsum gray to cinereous .... **31. flavipalpis**

9(6). Abdomen shiny fulvous, with paired black spots on apical tergites 2 or 3; posterior 0.7 to 0.8 of frontal vitta velvety black, anterior 0.3 to 0.2 yellow to fulvous; occiput shiny black; parafrontals, especially adjacent to dark portion of frontal vitta subshiny to shiny black; in profile, fore tarsal segments 2 to 4 dorsoventrally enlarged 10
Abdomen subshiny to densely pruinescent; occiput grayish pruinescent; frontal vitta without a clearly defined anterior and posterior black and fulvous area; parafacials uniformly pruinescent; in profile, fore tarsi without dorsoventral enlarged segments 11

10(9). Abdominal tergite 2 without large, paired black spots; tergite 4 with two round lateral spots .... **34. tobi**
Abdominal tergite 2 with large, paired black spots; tergite 4 with large median dark spot .... **40. ? laeta**

11(9). *F2* and *F3* mostly, palpi and fore tarsi entirely, black to fuscous .... **37. boninensis**
F2 and *F3* mostly or entirely yellow; usually apex or more of palpi fulvous 12

12(11). Scutellum entirely dark in ground color .... **36. sabroskyi**
Scutellum yellow to brownish fuscous apically .... **35. oryzae and 38. neoatripalpis**

28. Atherigona longipalpis Malloch (figs. 4, *c*; 14, *e*; 15, *h*).

Atherigona (*Acridochaeta*) *longipalpis* Malloch, 1923, Ann. Mag. Nat. Hist. IX, **12**: 182.

Predominantly yellowish, male easily recognized by very large antennae, greatly elongated, narrow palpi (fig. 4, *c*), excised apex of *F1* and long hairs on inner margin of fore tarsi (fig. 15, *h*).

The previously undescribed female has palpi broader and more elongated (fig. 14, *e*) than in other Micronesian *Acridochaeta*, but lacks fringe of curled tarsal hairs present in the male.

Antennae are not so large and conspicuous. *F1* fuscous, except at extreme base and apex.

DISTRIBUTION: S. Mariana Is.

S. MARIANA IS. GUAM: 20; 1945, Bohart and Gressitt; Fadang, June 1945, Dybas; Pt. Ritidian, June 1945, Jan. 1946 on human feces, Gressitt; Piti, July 1936, Swezey; Orote Peninsula, Sept. 1936, ex rotten *Ochrosia* fruit, Swezey.

Bohart and Gressitt illustrate the eggs and pupae; and report that the flies are frequent near garbage dumps, flying around a rotten coconut; that adults were reared from rotting breadfruit hanging on trees. According to them, adults will oviposit in vials in the laboratory and these eggs can be "reared

without difficulty on both canned peas and spoiled beef" (1951, B. P. Bishop Mus., Bull. **204**: 110).

29. Atherigona trukensis Snyder, new species (figs. 3, *a*; 15, *a*).

Male: 4.4 mm. long. Head fulvous yellow to gray pruinescent; occiput with irregular fuscous areas; frontal vitta reddish brown posteriorly, becoming fulvous red anteriorly. Antennal segments 1 and 2 fulvous red, 3 fuscous. Arista yellowish white on basal 0.5 to 0.6, darkened apically. Palpi narrow, moderately long, and with an apical tuft of short, fine, curly hairs.

Thorax entirely fulvous, except for light brownish dorsum; all parts covered with dense yellowish to yellowish-gold pruinescence; with a dark median vitta and a narrower one in each *dc* plane; none extend to scutellar suture. Lower *st* bristle about as long as anterior one. The 15 setulae in transverse dorsal mesopleural row become shorter and more hairlike as they approach perpendicular posterior row.

Legs fulvous, except *T3* and a dorsal, fuscous-brown spot on apical 0.3 of dorsal

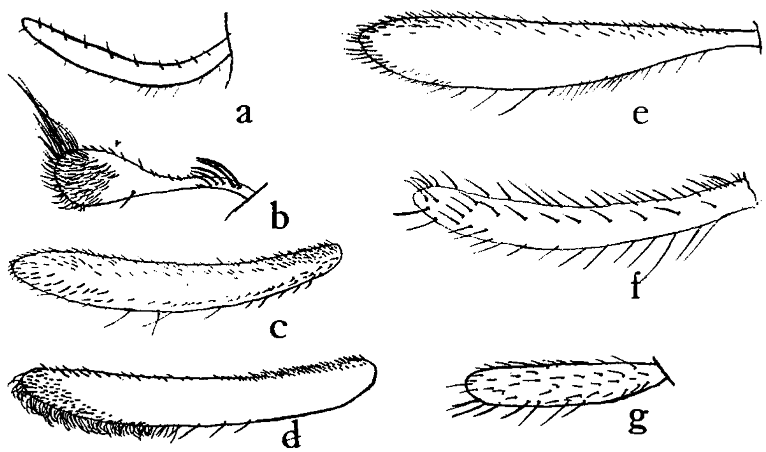


FIGURE 14.—Palpi, outer surface: **a**, *Atherigona oryzae*, female; **b**, *A. oryzae*, male; **c**, *A. excisa*, female; **d**, *A. flavipalpis*, male; **e**, *A. longipalpis*, female; **f**, *A. dybasi*, male; **g**, *A. pottsi*, male.

concavity of *F1*. *F1:* a long, shallow dorsal excavation; the apex somewhat knobbed and bears a tuft of very short, fine hairs; *pv* surface with three to four fine bristles on swollen apical portion and without clearly defined *pv* bristles (fig. 15, *a*). *T1* without bristles except a very short apical *d*. Fore tarsus of almost uniform diameter throughout, not unusually modified and with only usual short clothing setulae. *F2* without bristles, except on apical *p* surface. *T2:* a median *p*, and an apical *av* and *v* bristle. *F3:* three or four *av* clothing hairs longer than others and 0.5 to 0.7 as long as height of *F3* where situated. *T3:* a short submedian *pd, ad,* and *av* bristle.

Wings slightly yellowish hyaline; a very diffuse brownish cloud along fore margin of wing is most intense between apices of first and second veins and extends posteriorly somewhat beyond second vein where it gradually blends into the general wing color (fig. 3, *a*). Third and fourth veins slightly convergent apically; distance between them at apex of first posterior cell is about 1.5 times the length of anterior cross vein. Anterior cross vein inserted at or slightly beyond middle of discal cell; very slightly sigmoid posterior cross vein is opposite basal 0.33 to 0.40 of first posterior cell. Calyptrae distinctly yellowish brown; halteres yellow.

First visible abdominal tergite entirely fulvous yellow, unmarked. Second mostly yellow on dorsum, and unspotted; the sides fuscous except a broad ventroapical fulvous area; most of ventral portion of sides covered with many short, fine, yellow hairs. Dorsum of tergite 3 fuscous, with indications of two or three round brown spots; 4 fulvous and with two round brown spots. Tergites 1 and 2 very long, subequal; 3 and 4 very short.

Female: 4.8 mm. long. Similar to male; differs in having base of palpi fulvous, blending into brownish fuscous apically; distinctly broader than in male and without apical tuft of curly hairs.

Thoracic vittae narrower, brown, median one reaching to scutellar suture. Ground color of thoracic disc more brownish fuscous, but with same dense golden-yellow pruinescence.

F1 without dorsal excavation, brown except at base and apex. *T1* brownish apically. *F1* with a complete row of strong *pd* and a single preapical *pv* bristle. *T3* with an apical *d, pd,* and *pv* bristle.

Wings somewhat more yellowish tinged than in male, but without even a faint cloud at apex of subcosta.

Abdomen yellowish fulvous; grayish yellow pruinescent but with traces of paired spots, and an interrupted median vitta on tergites 3 and 4.

Holotype, male (US 67174), Moen, Truk, 200 m., July 31, 1946, Townes; allotype, female (US), topotypical, Civ. Ad. Area, Apr. 24, 1949, Potts.

DISTRIBUTION: Caroline Is. (Truk).

In the following species of *Atherigona,* the males have wings with more or less distinct clouds: *A. ustipennis* Malloch (1932, B. P. Bishop Mus., Bull. **98**: 201); *A. jackobsoni* Malloch (1928, Ent. Mitteil. **17**: 297); *A. apicemaculata* Hennig (1952, Beitr. zur Ent. **2**: 62); *A. ovatipennis* Malloch (1935, Federated Malay States Mus., Jour. **17**: 646); *A. pendelburyi* Malloch, ibid., *A. hendersoni* Malloch (1923, Ann. Mag. Nat. Hist. IX, **12**: 184; **13**: 413); *A. maculipennis* Stein (1910, Linn. Soc. London, Proc. **14**: 158, 1910).

Males of *trukensis* differ from those of *jackobsoni* in lacking preapical *pv* bristles on *F1,* and a long apical *a* on *T1* and in not having fourth and fifth tarsal segments distinctly thickened; females differ in lacking distinct fuscous apical fasciae on first and second abdominal tergites.

From males of *apicemaculata,* the only sex known, *trukensis* differs in lacking spots on the first two visible abdominal tergites and in not having the first three fore tarsal segments distinctly swollen.

From *ustipennis* males, it differs in lacking a distinct "knife-like" V-shaped elevation near apex of *F3,* and from females in not having the apices of wings "stained with brown" and in having the abdominal spots paler and less clearly defined.

It differs from males of the Malayan *ovatipennis* and *pendelburyi,* the only described sex, in having the wing spot more diffuse, the fore tarsi without expanded second and third segments as in *ovatipennis* and without several groups of long, curly, dorsal bristles on *T1* as in *pendelburyi.*

Males of *hendersoni* differ from *trukensis* in having disc of scutellum darker than margins, second and third abdominal tergites without fuscous spots near posterior margin and in having the anterior cross vein inserted at

or beyond middle of discal cell; females differ in having the median thoracic vitta continued onto the scutellum and the abdominal bristles and hairs arising from dark spots; the base of *F2* and most of *F3* is fuscous in *hendersoni* females.

A. trukensis differs from males of *maculipennis* in lacking outstanding hairs on sides of the fore tarsal segments, in not having the first posterior cell strongly narrowed at apex, and the fuscous spot on wings not confined to the tip; females differ in not having "legs almost entirely black."

30. **Atherigona excisa** (Thomson). (Figures 4, *b*; 14, *c*; 15, *c*.)

? *Atomogaster triseriata* Walker, 1861, Linn. Soc. London, Proc. **6**: 11.—Stein, 1901, Zeitschr. Hymen. Dipt. **1** (4): 214.

Coenosia excisa Thomson, 1868, Kongl. Sven. Freg. Eugenies Resa, Diptera, 560.

Atherigona orientalis Schiner, 1868, Reise Novara, Diptera, 295.

Atherigona trilineata Stein, 1900, Term. Füzetek **23**: 157.

Acritochaeta pulviniata Grimshaw, 1902, Fauna Hawaiiensis **2**: 41.

Atherigona excisa var. *trilineata* Stein (of Malloch), 1932, B. P. Bishop Mus., Bull. **98**: 201.

Atherigona (*Acritochaeta*) *orientalis* Huckett, 1936, New York Ent. Soc., Jour. **44**: 191.

Head mostly dark in ground color but with sparse to dense gray pruinescence; frontal vitta, antennal segment 2 and a limited basal portion of 3 often partly or entirely fulvous. Palpi fuscous to brown, but not unusually shaped or bristled (fig. 14, *c*).

Thoracic dorsum generally dark, especially in male, but lighter in female; and with three darker but narrow longitudinal vittae, when viewed posteriorly. Apex and dorsolateral margins of scutellum usually with pale yellowish margins.

Legs mostly yellow, but with dark areas near apex of *F1* which are usually narrow in the male and broad in the female. *T2* and *T3* in both sexes vary from fulvous to light brown but never with distinct fuscous bands in either sex.

Abdomen mostly yellow with sparse gray pruinescence. Males with small but distinct, round, seal-brown spots on visible tergites 2 to 4 which are more extensive and subshining than those on 1; spots on latter concolorous and with indications of a longitudinal median vitta. Females with darker areas on tergites 1 to 3 and longitudinal dark vitta more expansive than in males. Usually hairs on lower (ventral) portion of tergites 3 and 4 are very short and dark.

DISTRIBUTION: Old and New World tropics and subtropics, Micronesia (except Gilbert Is.).

BONIN IS. 92. CHICHI JIMA: Omura, Apr.-June 1958, Snyder; Okumura, Apr. 1958, Snyder. ANI JIMA: Sen-zan, May 1958, Snyder; Southwest Bay, May 1958, Snyder. HAHA JIMA: Okimura, Apr.-May 1958, Snyder; July 1951, Bohart.

VOLCANO IS. IWO JIMA: Eight, Sept. 1945, Dybas; June 1958, Snyder.

N. MARIANA IS. Five. PAGAN: Apr. 1940, Yasumatsu and Yoshimura. ANATAHAN: Aug. 1951, Bohart; May 1952, Owen.

S. MARIANA IS. 57. SAIPAN: Nov. 1944, Hagen; July 1951, Bohart; Mar. 1948, Lange; Aug. 1944, no collector; Feb. 1958, Krauss; As Mahetog Area, Dec. 1944, Dybas; Nov. 1944, Edgar; 1 to 2 mi. E. Tanapag, Nov.-Dec. 1944, Oct. 1945, Dybas. TINIAN: Nov. 1952, Beardsley. ROTA: June 1951, Bohart. GUAM: Agana, May 1945, mess hall, Bohart and Gressitt; Aug. 1945, Dybas; Pt. Ritidian, June, Aug. 1945, human corpse, light trap, Gressitt; Oct. 1952, Krauss; Pt. Oca, May, June, July 1945, rotten male sago palm, reared from bread fruit, light trap, Bohart and Gressitt; Talofofo, June 1946, Townes; Pago, Oct. 1946, sweeping garbage dump, Gressitt; Pago Bay, June 1945, Dybas; Togaha, May 1945, Gressitt; Mt. Alifan, Apr. 1946, Krauss; Merizo,

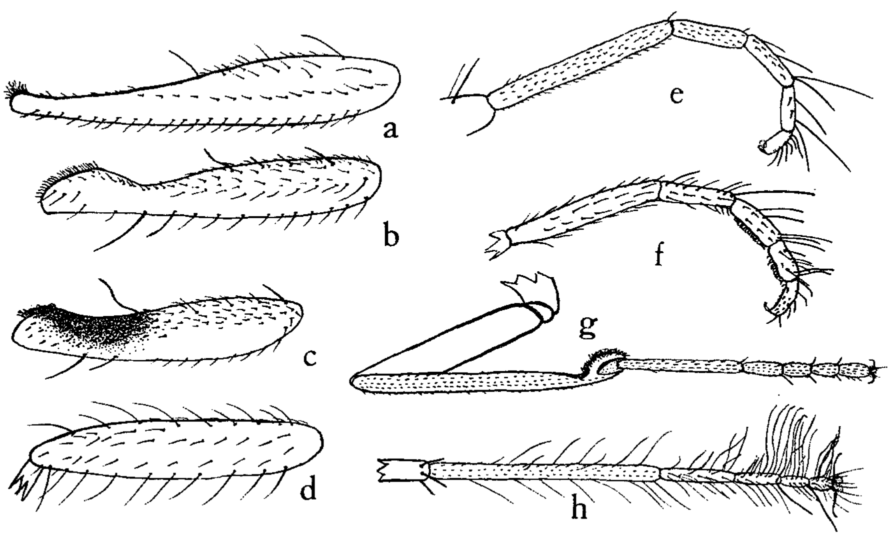


FIGURE 15.—Legs, male: **a**, *Atherigona trukensis, F1,* posterior view; **b**, *A. flavipalpis, F1,* posterior view; **c**, *A. excisa, F1,* posterior view; **d**, *A. dybasi, F1,* posterior view; **e**, *A. boninensis,* fore tarsus, posterior view; **f**, *A. tobi,* fore tarsus, posterior view; **g**, *A. pottsi, T1* and fore tarsus, dorsal view; **h**, *A. longipalpis,* fore tarsus, dorsal view.

May 1948, Maehler, Quarantine Pearl; Guam, Dec. 1945, Bohart; Guam, 1911, Fullaway.

PALAU. 37. BABELTHUAP: Ngerehelong, May 1957, Sabrosky; Ngaremlengui, June 1957, Sabrosky; Ngardmau, May 1957, Sabrosky; Imeliik, Netkeng, June 1957, Sabrosky; S. E. Ulebsehel I., Apr. 1957, Sabrosky; Ngiwal, May 1957, Sabrosky. KOROR: Apr. 1957, Sabrosky; July 1956, McDaniel; Jan., May, July 1953, at light, Beardsley; May 1924, Uchiyama; July 1946, Townes. PELELIU: No. Central Part, July 1945, Dybas; East Coast, Jan. 1948, Dybas. NGAIANGL: May 1957, Sabrosky. NGARMALK: Apr. 1957, Sabrosky. NGURUKDABEL: Apr. 1957, Sabrosky. AULUPTAGEL: May 1953, Beardsley; Sept. 1952, Krauss.

YAP. 31. YAP: Oct. 1952, Krauss; Kolonia, July-Aug. 1950, Goss; Ruul Dist., July-Aug. 1950, Goss; Gagil Dist., July-Aug. 1950, Goss; Giliman, July-Aug. 1950, Goss, June 1957, Sabrosky; Weloy, June 1957, Sabrosky. RUMUNG: June 1957, Sabrosky.

CAROLINE ATOLLS. 11. IFALUK: Ifaluk I., Aug. 1953, beating ferns, Bates. LAMOTREK: Lamotrek I., Feb. 1953, Beardsley. KAPINGAMARANGI: Nunakita I., Aug. 1954, Niering; Werua I., Aug. 1954, Niering. PINGELAP: July 1949, Owen.

TRUK. 80. WENA (Moen): Jan. 1949, Ross; July 1946, Townes; Civ. Ad. Area, Feb.-Mar. 1949, Potts; Mt. Teroken, Feb. 1953, human feces, Gressitt; Mt. Tonaachau, south slope, Feb. 1949, Potts.

PONAPE. Mt. Temwetemwensekir, north slope, Jan. 1953, Clarke; Nanpil, Net Dist., Feb. 1948, Dybas.

KUSAIE. Two, July 1949, Owen; Pukusrik, Apr. 1953, 1 m., attracted to dead marine worm in log, Clarke.

MARSHALL IS. 54. ARNO: Ine I., July 1950, La Rivers. KWAJALEIN: N. Gugegwe, Aug. 1944, Bryan; Ebeye I., Sept. 1953, Clagg. MAJURO: Uliga I., Oct. 1953, Beardsley. WOTHO: Wotho I., Oct. 1953, Beardsley. JALUIT: Jabor I., May 1958, Gressitt. AILINGLAPALAP: Wotje I., Oct. 1953, Beardsley. NAMU: Kaginen I., Oct. 1953, Beardsley; Nanu I., Oct. 1953, Beardsley. LAE: Lal I., Oct. 1953, Beardsley. RONGELAP: July 1946, Morrison. UJAE: Bok I., Feb. 1952, Fosberg. ENIWETOK: Japtan Is., Aug. 1956, Tuthill.

WAKE ATOLL. PEALE I.: 16, Mar., Aug. 1940, Lyons; Nov. 1953, Joyce.

OCEAN I. BANABA: Two, Dec. 1957, Krauss.

Adults of this species, like numerous other common muscids, feed on, or have been observed to visit fresh to decaying plant and animal material including human and animal feces.

Bohart and Gressitt (1951) indicate that the larvae may be predacious on *Dacus* and *Limnophora plumiseta*. However, the species is probably not an obligate predator as it is known to breed in a great variety of decaying material upon which the adults also feed.

In Natal, Brazil, this was one of the most abundant species of flies which I found on screened windows; many adults were seen with their subquadrate heads stuck in the mesh of the screen.

A. excisa is found in all parts of Micronesia except the Gilbert Islands. It undoubtedly occurs there also.

The names *excisa* or *orientalis* have been used for this species; both were proposed in 1868 but insofar as I am aware it cannot be determined exactly which paper was published first. C. W. Sabrosky has indicated in conversation that as the result of considerable bibliographic study, he believes the Schiner paper may be presumed to have been published earlier in 1868 than Thom-

son's paper based on dates of reviews of both publications in European literature. I suspect that a name prior to 1868 may be found for this very widespread species, and until early types can be resolved I use *excisa* because of its brevity.

31. Atherigona flavipalpis Malloch (figs. 14, *d*; 15, *b*).

Atherigona excisa var. *flavipalpis* Malloch, 1928, Ent. Mitteil. **17**: 303; 1932, B. P. Bishop Mus., Bull. **98**: 201.

This species seems to be entitled to specific status in view of its widespread occurrence in Micronesia and other adjacent islands. The male genitalia of it and *excisa* are identical, but the absence of dark color at base of palpi and absence of fine, pale hairs on the ventral portion of the fourth abdominal sternite in the male will distinguish *flavipalpis* from *excisa*.

Laboratory rearing and crossing experiments of these two species, where they occur side by side (as at Wena, Truk) should establish whether or not the two are merely forms or distinct species. Examination of many samples of *excisa* populations from such widely separated areas as Florida, U.S.A., Natal, Brazil, and several localities in West Africa in my collections show no individuals with entirely yellow palpi, and light colored hairs on fourth male abdominal tergite.

DISTRIBUTION: Sumatra, Marquesas, Caroline Is., Marshall Is., Marcus I.

PALAU. KOROR: Three, July, Sept. 1952, Beardsley; southwest, 25 m., Dec. 1952, light trap, Gressitt.

YAP. YAP: Seven, Kolonia, July, Aug. 1950, Goss.

CAROLINE ATOLLS. Six. LAMOTREK: Lamotrek I., Feb. 1953, Beardsley. NOMWIN: Fananu I., Feb. 1954, Beardsley. PINGELAP: Jan. 1953, Gressitt.

TRUK. WENA (Moen): 31, Civ. Ad. Area, Feb., Mar., Apr. 1949, Potts; Mt. Tonaachau, s. slope, Feb. 1949, Potts.

KUSAIE. One, Mutunlik, 22 m., Feb. 1953, sweeping over feces, Clarke.

MARSHALL IS. 72. ENIWETOK: Japtan I., Aug. 1956, Tuthill; Enjebi (Engebi) I., Jan. 1951, ex *Scaevola,* Oshiro; Elugelab, Jan. 1951, sweeping *Scaevola,* Oshiro. KWAJALEIN: N. Gugegwe, Aug. 1944, Bryan; Ebeye, Oct. 1953, Beardsley. NAMU: Kaginen I., Oct. 1953; Lal lal, Oct. 1953, Beardsley. MAJURO: Uliga I., Oct. 1953, Beardsley. ARNO: Ine I., June, July, Aug. 1950, La Rivers. RONGELAP: July 1946, Morrison. JALUIT: Imrodj I., Aug. 1946, Townes.

MARCUS I. Four, May 1952, Sakagami.

32. Atherigona dybasi Snyder, new species (figs. 1, *i*; 14, *f*).

Male: 4.2 mm. long. Head black, grayish pruinescent except for golden-yellow juncture of parafacials and parafrontals.

The single male has the head crushed from front to back, which obscures parafrontal bristles; but there appear to be about seven pairs, and a single weak pair which

are inserted below level of base of antennae. Eyes apparently with an area of enlarged facets anteriorly near middle. Palpi fulvous yellow, slightly longer than mentum, slender, moderately long, very slightly curved; with several rows of short, rather strong, black clothing setulae and a few short, pale ventral hairs.

Thorax black, grayish brown pruinescent. Viewed from above and behind with a narrow transverse, postsutural brown band and indications of two incomplete presutural dorsocentral vittae. Dorsum of scutellum subshiny brown, except an obscure, apical grayish pruinescent area. The two *presut dc* bristles more clearly differentiated than in most *Atherigona, ac* setulae as two or three *presut* and four to seven *postsut* irregular pairs. Dorsum of scutellum with numerous, almost uniform, short clothing setulae; stigmatal bristle as long as accessory anterior prothoracic. Sternopleura without clothing setulae above base of hind coxae, but with a strong anterior and posterior *st* bristle and two setose hairs between, but below them, anterior of these shortest; extreme ventral extension of sternopleura with a tuft of short, stiff setulae.

Legs black, base of tibiae very narrowly yellow to fulvous. *F1* with a complete row of *pd* and *pv* bristles. *T1:* two submedian *pv* bristles and many of the clothing setulae on apical 0.67 of *v* surface subequal to *T1* diameter. *F2:* two weak median *a* and a row of long *v* bristles which become shorter but more numerous preapically; a single preapical *p*. *T2:* one median *p*; longish pubescence on *v* surface similar to that on *v* surface of *T2* of many *Fannia* spp. males. *F3:* usual *ad* row; two short *av* bristles on basal 0.5. *T3:* one short *ad, av,* and *pd* bristle slightly beyond middle, last two on almost same transverse plane.

Wings hyaline, very faintly tinged along second and third vein; latter ending at wing tip and fourth very slightly curved forward apically. Anterior cross vein inserted at or slightly beyond middle of discal cell, and opposite a point midway between apex of subcosta and first vein; posterior cross vein distinctly longer than apical portion of fifth vein. Calyptrae white, the lower one 2.0 times as long as upper; halteres yellow.

Abdomen longer and more slender than usual. Segment 1 entirely shiny fulvous and almost twice as long as wide, and 1.5 times as long as combined lengths of second to fourth visible tergites. These last three tergites become progressively shorter toward abdominal apex; black, subshiny, but with a narrow transverse gray pruinescent basal band. Basal hypopygial segment very large and prominent, shiny black. In profile, apical two abdominal tergites and enlarged hypopygium are curved ventrally; strong apical bristles become stronger and longer and more numerous on segments 1 to 4 respectively. Basal hypopygial segment with numerous, closely placed setose hairs of almost uniform length over median portion; sides of this segment entirely bare. Juncture of superior forceps with basal segment not clearly defined, except by termination of gray pruinescence on forceps. Sternite 5 rather prominent, and with a deep U-shaped incision; inner margin with long, strong bristles, two of these at apex of each process somewhat flattened throughout, and their apices abruptly curved posteriorly in the form of a hook (fig. 1, *i*).

Female: 4.6 mm. long. Parafrontals yellowish pruinescent; remainder of head grayish pruinescent. Frontal vitta velvety reddish brown and with a clearly defined frontal triangle. Short parafrontal bristles continued ventrad to opposite juncture of antennal segments 3 and 2. Anterior ocellars distinctly longer than longest setae on antennal segment 2 and subequal to strongest parafrontals. Eye facets near juncture of parafacials and parafrontals slightly larger than those along posterior margin of eye. Facial ridges with very short setose hairs which extend dorsally to opposite apical 0.3 to 0.4 of antennal segment 3. Antennae fuscous; juncture of segments 2 and 3 reddish. Arista fulvous basally, becoming brownish apically. Aristal segment 2 almost three times as long as its diameter and the thickened basal part of segment 3 at least as long as the length of 2.

Transverse brown thoracic band more extensive than in male with a median brown vitta and three broad, *presut* vittae. Ventral tuft of *st* setae shorter and less conspicuous than in male.

T1 without median bristles or long *v* setulae. *F2* with two median *a* and a single preapical *p* bristle. *T2* without distinct *v* pubescence. Hind legs as in male.

Abdomen somewhat longer and narrower than most female *Atherigona.* Tergites 1 to 4 subequal in length in dorsal and lateral view; tergite 1 fulvous subshiny, others fuscous, brownish gray pruinescent; 2 to 4 with a pair of triangular spots which become progressively smaller.

Holotype, male (BISHOP 3559), Koror, Mar. 1, 1953, at light, Beardsley?; allotype, female (US), Palau Is., Ulimang, Babelthuap I., Dec. 25, 1947, Dybas; paratype (BISHOP): female, same data as type except Dec. 11, 1952; female, topotypical, Apr. 29, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

The two *pv* bristles on *T1,* ventral pubescence on *T2,* the shape, bristling, and color of abdominal segments are completely different from any other described *Atherigona* species.

33. Atherigona pottsi Snyder, new species (fig. 14, *g*; 15, *g*).

Male: 3.4 to 3.6 mm. long. Head fuscous, grayish pruinescent; frontal vitta fulvous brown, somewhat lighter anteriorly, and without clearly defined triangle. Parafrontals with five to six pairs of alternating short and long convergent bristles, the most anterior one short and inserted opposite middle of antennal segment 2 and without interspersed hairs. Anterior ocellar bristles somewhat shorter than divergent postocellars, and subequal to longest parafrontals and longest setae on antennal segment 2. Antennae fuscous brown. Arista, except basal two fulvous segments, concolorous with antennae. Palpi fuscous to black; straight, relatively broad, and as long as dark mentum.

Thorax fuscous, gray pruinescent; viewed from above and behind with three distinct dark, subshiny brown vittae in *dc* and *ac* planes, latter narrowest; basal 0.75 of scutellum concolorous with vittae and in the form of a complete transverse band; remainder of scutellum brown, blending to fulvous brown on declivities and ventral surface. Stigmatal bristle subequal to short accessory anterior prothoracic.

Legs fuscous to brownish fuscous, knees, *T2* and *T3* fulvous brown. *F1:* a complete row of short *pd* bristles; a short but distinct preapical *pv* bristle and a few adjacent setulae; *av* absent. *T1* with no well-developed bristles, but with a distinct *a* constriction on apical 0.25, apical portion beyond slightly more swollen anteriorly than usual and bearing a fasciculate series of very short, closely placed setae at apex (fig. 15, *g*). *F2* without bristles except one preapical *p*. *T2* with a short median *p*. *F3* without bristles except a row of very short *ad*. *T3* with a short median *ad* and *av* bristle.

Wings and calyptrae concolorous, hyaline, very faintly tinged. Anterior cross vein inserted basad to middle of discal cell, but opposite apex of subcosta. Third and fourth veins convergent apically, third ending slightly behind wing tip. Halteres yellow.

Abdomen with first two visible segments mostly yellow, 3 and 4 fuscous; the latter with brownish pruinescence. Dorsum of segments 1 and 2 with a transverse apical brown band which is narrowly interrupted at middle, 3 with a pair of round, velvety-brown apical spots, 4 unmarked and with only short decumbent hairs.

Female: 3.7-4.2 mm. long. Similar to male, but *T1* without preapical constriction and with usual short *d, pd,* and *pv* bristles.

Abdomen markings variable but all specimens have tergites 1 to 3 shiny brownish fulvous, and a narrow, transverse, shiny, brown apical band; 4 variably darkened and with a pair of round dark spots. Viewed at certain angles, the apical band on tergites 2 and 3 blend into lighter, subshiny triangular marks whose apices are anteriorly directed and separated mesally by a posteriorly directed, grayish-pruinescent triangle.

Holotype, male (US 67175), Moen, Truk, Civ. Ad. Area, Mar. 21, 1949, Potts; allotype, female (US), paratypes (BISHOP, CAS): male, three females, topotypical, but Mar. 5, 7, 10, 16, and Apr. 24 respectively.

DISTRIBUTION: Caroline Is. (Truk).

Both male specimens are slightly teneral, and the anterior pair of legs is missing in the paratype. It is possible, though I believe highly improbable, that the preapical *T1* constriction is due to the teneral condition.

A very teneral female (Ponape, S.E. Nanponmal, Jan. 11, 1953, light trap, cut native forest, Gressitt) may be this species, but because of its condition and different locality, it is not included in the type series.

34. **Atherigona tobi** Snyder, new species (figs. 15, *f*; 16, *b*; 17, *a*; 18, *a*; 19, *a*).

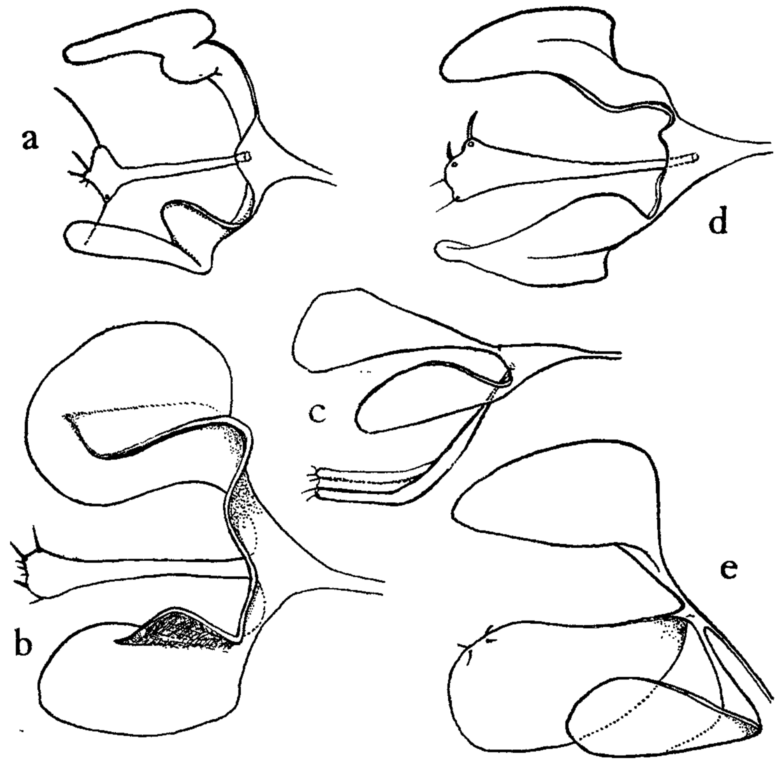


FIGURE 16.—Trifoliate processes, males, dorsolateral view: **a**, *Atherigona sabroskyi*; **b**, *A. tobi*; **c**, *A. oryzae*; **d**, *A. neoatripalpis*; **e**, *A. boninensis.*

Male: 2.5-2.7 mm. long. Head fuscous on dorsal 0.8 of occiput, posterior 0.7 of parafrontals and posterior 0.8 of frontal vitta; remainder fulvous. Occiput very sparsely gray pruinescent, but in certain angles it appears almost subshiny; parafacials and parafrontals densely gray pruinescent; darker portion of frontal vitta velvety. Antennal segments 1, 2, and base of 3 brownish red, remainder of 3 fuscous, gray pruinescent. Arista brownish fulvous. Palpi yellow, clavate. Basal tuft of short setae black.

Thorax fulvous; dorsum, including scutellum but excluding humeri, fuscous, densely gray pruinescent and with three narrow dark vittae, median one most distinct. Lower

posterior *st* conspicuously shorter than others. The three to five setae in transverse dorsal mesopleural row moderately strong, and widely spaced.

Legs fulvous, *T1* and tarsi fuscous to black. *F1* with two short *pd* on apical 0.25 to 0.33, and a single preapical *pv*. *T1* becomes gradually thickened from base to apex, without median bristle but with a short but distinct *d, pd,* and *v* bristle. First three fore tarsal segments in profile slightly more prominent than usual and slightly compressed laterally (fig. 15, *f*) ; several of the *a* to *d* clothing setulae on segments 2 and 3 upright and about as long as dorsoventral height of segment. *F2* without bristles except an apical *p*. *T2* with a very short median *p*. *F3* with only short *av* and *pv* clothing setulae. *T3*, submedian *pd, ad,* and *av* bristles short.

Wings hyaline. Anterior and posterior cross veins situated opposite basal 0.4 of discal and first posterior cells respectively. Calyptrae whitish hyaline, to faintly tinged with yellow; halteres fulvous.

Abdomen fulvous, with brown spots as follows: a median basal one on segment 1; a pair of slightly elongate lateral ones on 2, and with or without traces of a median brown line; a pair of small, round brown spots on 3 and 4. Hypopygial processes tridentate (fig. 17, *a*), trifoliate processes as in figures 16, *b*; 18, *a*; 19, *a*.

Female: 3.5 mm. long. Similar to male, but palpi longer and not clavate, and without clump of basal bristles. Fulvous color on thoracic dorsum continued from humeri onto most of notopleura. *T3* brownish, legs otherwise colored as in male. *T1* generally stouter than in male and fore tarsal segments somewhat more prominent, but dorsal setae not as distinct. *F1* with three to five *ad* bristles on apical 0.4 to 0.5.

Wings very slightly tinged with yellow. Abdomen without lateral spots on tergite 2.

Holotype, male (US 67176), allotype, female (US), paratypes (BISHOP): male and female, Tobi I., S. W. Caroline Is., Sept. 12, 1952, Krauss.

DISTRIBUTION: S. W. Caroline Is. (Tobi).

Superficially *A. tobi* resembles *bella* Frey (1917, Öfv. Finska Vet.-Soc., Förh. **59**: 17) because of the dark fore tarsi and *T1* as well as the longish setae on the former. In *bella* the hypopygial prominence has only two tubercles (Malloch, 1925, Dept. Agric. India, Ent. Ser., Mem. **8**, pl. 17, figs. A and B). It differs from *destructor* Malloch (1923, Ann. Mag. Nat. Hist. IX, **12**: 185; 1925, ibid., 111, 120) another species with yellow palpi, in having vibrissae black and differently shaped trifoliate process. It also differs from the Sumatra species with yellow palpi, *tridens* Malloch (1928, Ent. Mitteil. **17**: 303) in having the pleura more extensively fulvous, thoracic dorsum trivittate, no paired spots on first abdominal tergite, *F1* not darkened on the apical 0.5, and fourth and fifth tarsal segments not fulvous. The trifoliate process of *tridens,* though rather variable as illustrated by Hennig (1952, Beitr. zur Ent. **2**: 67), is quite distinct from this species.

35. **Atherigona oryzae** Malloch (figs. 14, *a, b*; 16, *c*; 17, *d*; 18, *c*; 19, *e*).

Atherigona oryzae Malloch, 1925, Dept. Agric. India, Ent. Ser., Mem. **8**: 117.

Male: Head fuscous except for very limited fulvous to yellow streaks around oral cavity and on frontal vitta at base of antennae; all parts gray pruinescent, except velvety frontal vitta which blends from fulvous anteriorly to seal-brown posteriorly. Middle of occiput below vertical bristles variably subshiny. Antennal segments 1 and 2 fulvous, 3 brownish fuscous, sparsely pruinescent and extending to oral margin. Arista yellowish brown basally, becoming fuscous apically. Palpi yellow except brownish base, shaped and bristled as in *tobi* (fig. 14, *b*).

Thoracic pleura yellowish anteroventrally blending to fuscous on dorsum; all parts with dense grayish-yellow pruinescence; humeri yellow; apical margin of scutellum narrowly fulvous to yellow; a very narrow dark vitta in each *dc* plane.

Legs yellow to fulvous yellow except a narrow preapical brown band on *F1*; *T1* becomes darker apically and is concolorous with three basal tarsal segments, apical two fore tarsal segments fulvous. *F1* with a few short *pd* bristles along most of its length, and with one preapical *pv*. *F2* without bristles except preapical *p*. *T2* with a short median *p*. *F3* bristles in *pd* row very short; *av* and *pv* surfaces with usual clothing hairs only. *T3:* submedian *ad, pd,* and *av* setae short. All tarsi slender, normal.

Wings almost glassy hyaline except, at apex of subcosta, a small faint, brownish shadow which does not quite extend to apex of first vein. Anterior cross vein inserted slightly basad to insertion of subcosta into costa, and opposite basal 0.45 of discal cell; perpendicular posterior cross vein is opposite basal 0.40 of first posterior cell. Calyptrae hyaline, faintly tinged with yellow; halteres yellow to whitish yellow.

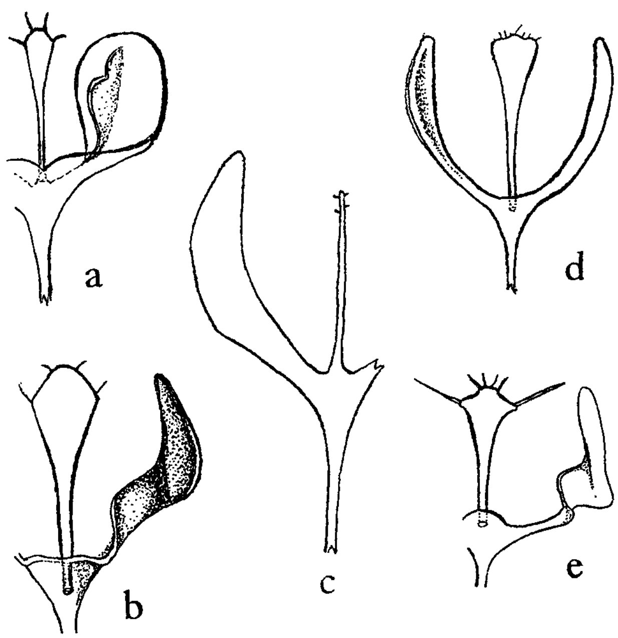


FIGURE 17.—Male trifoliate process, dorsal view: **a,** *Atherigona tobi*; **b,** *A. neoatripalpis*; **c,** *A. boninensis*; **d,** *A. oryzae*; **e,** *A. sabroskyi.*

Abdomen yellow to fulvous; tergites 1 and 4 unspotted; 2 with a pair of large, slightly elongate, seal-brown spots; 3 with a pair of small, round ones. When viewed from above and behind, there is dense, slightly brownish gray pruinescence between, and laterad to dark spots. Hypopygial prominence bidentate (fig. 17, *d*); trifoliate processes as in figures 16, *c*; 18, *c*; 19, *e*.

Female: Quite similar to male, but differs in its slender, curved, and slightly darkened palpi (fig. 14, *a*).

Dark areas on *F1* and *T1* black to blackish fuscous, and somewhat more extensive than in male. Fore tarsi black.

Faint spot at apex of subcosta much smaller than in male, or entirely absent. Calyptrae almost white.

Abdomen with traces of three diffuse, subshiny, yellowish-brown spots on tergite 2, a linear brown spot on 3, and a pair of very small, indistinct spots on 4.

DISTRIBUTION: India, Bonin Is., Volcano Is., and Caroline Is.

BONIN IS. 67. CHICHI JIMA: Omura, Apr., May, June 1958, Snyder; Sakai-ura, May 1958, Snyder; Yoake Yama, Apr. 1958, Snyder. ANI JIMA: S.W. Bay, May 1958, Snyder. HAHA JIMA: Okimura, Apr., May 1958, Snyder.

VOLCANO IS. Iwo JIMA: Four, June, Sept. 1945, 1958, Dybas, Snyder.

PALAU. BABELTHUAP: Dec. 1947, Dybas; Ngerhelong, May 1957, Sabrosky; Airai, Ngarsung, May 1957, Sabrosky; Ulimang, Dec. 1947, Dybas.

YAP. 10. YAP: Kolonia, July, Aug. 1950, Goss. MAP: South part, July, Aug. 1950, Goss.

TRUK. WENA (Moen): Four, Civ. Ad. Area, Mar. 1949, Potts.

PONAPE. One, Colonia, June-Sept. 1950, Adams.

These specimens agree well with Malloch's description and his figures of the hypopygial prominence and the trifoliate process. However, specimens in the U. S. National Museum, determined as *oryzae* by Malloch, are quite different in the shape of the hypopygial prominence and in the coloring and markings of the thorax.

36. **Atherigona sabroskyi** Snyder, new species (fig. 16, *a*; 17, *e*; 18, *e*; 19, *c*).

Male: 2.3 mm. long. Head brownish fuscous; frontal vitta seal-brown posteriorly, gradually becoming reddish fulvous anteriorly; ocellar triangle grayish pruinescent, remainder of head slightly yellowish gray pruinescent. Ocellar bristles strong, with a complete row of short parafrontals. Antennae large, ending at oral margin; segment 2 reddish fulvous, concolorous with anterior margin of frontal vitta; segment 3 fuscous, gray pruinescent, but with a very limited inner basal area to about opposite insertion of arista, concolorous with 2. Arista reddish brown basally, somewhat brownish apically. Palpi very short, strongly curved, whitish yellow, area basad to short basal tuft of dark hairs brownish to fuscous. Mentum shiny brown. Occiput with two rows of setae. When viewed from above and behind, back of head is subshiny brownish from apex to neck; in other views this area is less conspicuously subshiny than in female.

Thorax with dorsum badly rubbed or abraded so that it appears shiny, but with indications of slightly yellowish-gray pruinescence; humeri more golden yellow and plurae more yellowish gray pruinescent. *St* in an equilateral triangle; all pleural and few remaining dorsal bristles dark.

Fore legs yellow except *F1* with a subshiny brownish band on apical 0.4 excepting the yellowish tip; *T1* yellowish at base becoming more intensively brown toward apex; fore tarsi brownish becoming fulvous apically. Mid and hind legs entirely yellow. *F1* with two shortish preapical *pd*, and a much longer *av*. *T1* without median bristles; preapical *d*, *pd* and *v* bristles very short. *F2* with a preapical *p*; no other bristles. *T2* with one very short median *p*. *F3* without *av* or *pv* bristles. *T3:* one short median *ad* and *av*. Tarsi normal, segment 5 small.

Wings hyaline; anterior cross vein inserted opposite apex of subcosta; posterior cross vein perpendicular and straight; third and four veins subparallel or very slightly

Abdomen yellowish, with very sparse, pale pruinescence; tergite 1 with a pale-brown, transverse linear streak slightly beyond middle on each side; 2 very long, with a very large brown oval spot on each side of midline; 3 small, with a small, round

brown spot near middle of tergite on each side. Hypopygial prominence as in figure 17, *e*; trifoliate processes as in figures 16, *a*; 18, *e*; 19, *c*.

Female: 2.4-2.6 mm. long. Similar to male, but reddish area on frontal vitta usually reduced to extreme anterior margin; subshiny brown area on back of head very slightly grayish pruinescent but usually more expansive than in male. Palpi longer and less curved than in male, fulvous with base fuscous.

Thoracic dorsum yellowish gray pruinescent; not vittate; otherwise as in male. Legs as in male but darkened area of *F1* and *T1* more extensive; tarsi of all legs fuscous brown, and *T3* becomes slightly brownish apically. *F1* with a row of *pd* setae. Legs otherwise bristled as in male.

Abdomen with a pair of large brown linear spots on tergites 2 to 4 and a median brown line on 2 and 3.

Holotype, male (US 67177), allotype, female (US), 12 paratype females (BISHOP, US), Palau Is., Ngaiangl A., May 9, 1957, Sabrosky; one, Palau

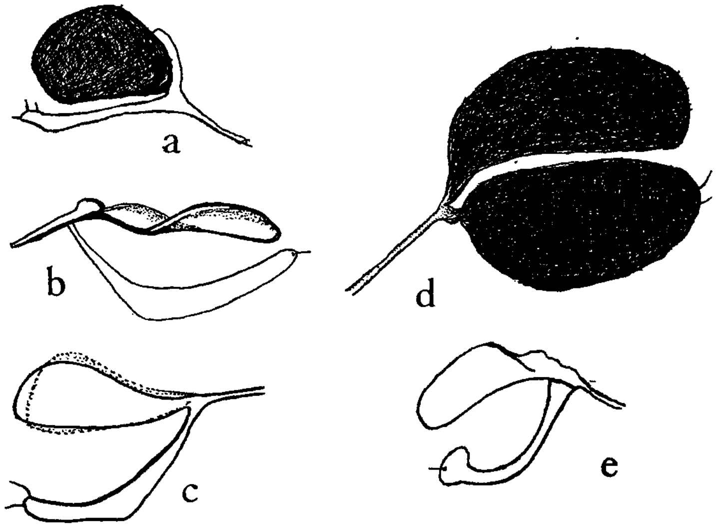


FIGURE 18.—Trifoliate processes, male, lateral view: **a**, *Atherigona tobi*; **b**, *A. neoatripalpis*; **c**, *A. oryzae*; **d**, *A. boninensis*; **e**, *A. sabroskyi*.

Is., S.E. Ulebsehel I., Apr. 21, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

The male description was prepared before relaxing the specimen. This species traces to *erichloae* in Malloch's key (1925, Dept. Agric. India, Ent. Ser., Mem. 8 (11): 117) and the illustrations of the hypopygial prominence and trifoliate process (op. cit., pl. 18, fig. 10, *a-d*) indicates that the two species are closely related. The yellow interfrontalia and the four pairs of small dark dorsal abdominal spots will distinguish *erichloae* from *sabroskyi* in both sexes.

37. Atherigona boninensis Snyder, new species (figs. 1, *h*; 15, *e*; 16, *e*; 17, *c*; 18, *d*; 19, *d*).

Male: 3.2-4.7 mm. long. Head black except for yellowish to fulvous lower margin of cheeks; all parts grayish pruinescent. Back of head below vertex with a limited dark area which is subshiny in certain angles. Parafacials and parafrontals nowhere shiny. Frontal vitta velvety black; antennal segment 2 fuscous brown, 3 black, gray pruinescent and reaching oral margin; arista yellowish basally, becoming fuscous apically. Palpi fuscous, apex yellow and similar to *neoatripalpis.*

Thorax black, grayish pruinescent except humeri which are somewhat lighter in ground color; mesonotum with three faint, narrow, brown vittae in *ac* and *dc* planes and not extending on to entirely fuscous scutellum.

Fore legs black except coxae, trochanters, knees, tarsal segments 4 and 5, and a very limited basal region of *F1,* fulvous; remainder of legs yellow to fulvous except a large basal fuscous area on coxae; with or without a variable subbasal fuscous brown area on *F2,* and brownish *T3. F1* with four to six *pd* bristles on apical 0.50 to 0.66, and one or two distinct preapical *pv*; fore tarsal segments 4 and 5 with several long *d* apical to preapical hairs (fig. 15, *e*). *F2* with one preapical *p. T2* with one short submedian *p. F3* with only the usual *ad* row of bristles. *T3* with a short submedian *ad, av,* and *pd* seta. Mid and hind tarsi not modified.

Wings hyaline. Third and fourth veins subparallel or very slightly convergent preapically. Anterior cross vein situated slightly beyond level opposite insertion of subcosta into costa; posterior cross vein perpendicular, straight. Calyptrae white; halteres yellow.

Abdomen as in figure 1, *h,* yellowish fulvous, gray pruinescent; first visible tergite with a pair of subtriangular pale to deep-brown spots; tergite 2 with a pair of elongate seal-brown to black spots and a narrow pale brown median line; 3 and 4 with a pair of round brown spots, largest on 3; ventral margins of tergites 1 and 2 sometimes darkened. Hypopygial prominence and trifoliate processes as in figures 16, *e*; 17, *c*; 18, *d*; 19, *d.*

Female: 3.8-5.3 mm. long. Similar to male, but antennae not quite so large; oral margin usually pale, and palpi long, slender, and entirely fuscous. Fore legs as in male, but without long dorsal tarsal hairs. *F1* and *F3* mostly fuscous, though often basal 0.3 to 0.4 of *F3* fulvous. *T3* mostly fuscous. All tarsi dark.

Abdomen mostly piceous, but with variable fulvous streaks or incisions. Visible tergites 1 to 4 with paired spots; those on tergite 1 expansive but not sharply defined, while those on 2 and 3 are large and elongate, and on 4 small. Tergites 2 and 3 with a narrow brown median line.

Holotype, male (US 67178), allotype, female (US), paratypes (BISHOP, US), seven males and 24 females: Bonin Is., Chichi Jima, Omura, "Camp Beach," May 5-June 9, 1958; other paratypes: five males, three females, topotypical, Apr. 2-25, 1958; two males, Sakai-ura, "Bull Beach," May 12-31; Apr. 5-25, 1958; five females, Miyanohama, "Jack Wm's Beach," May 12 to June 9, 1958; two females, Yoake-Yama, Apr. 21, 1958; female, Yatsutse R., "Gen's Beach," Apr. 10-22, 1958; Ani Jima: male, female, Sen-zan, N.E. beach, May 28, 1958. Ototo Jima: male, four females, Kamuri-iwa (S.W. Bay), June 3, 1958; male, female, Hirone, N.W. Bay, Apr. 9, 1958. Haha Jima: 35 females, Okimura, Apr. 26 to May [labeled June, in error] 9, 1958. All Snyder.

DISTRIBUTION: Bonin Is.

The enlarged median "leaf" of the trifoliate process indicates the close relationship of this species to *lobokensis* Hennig, and *pilimana* Hennig (1952,

Beitr. Ent. 2:64, 67). *A. pilimana* has long hairs on ventral surface of fore tarsi ("vordertarsus unterseits mit sehr langen Haaren") while *boninensis* has the longest hairs on the dorsal surface of the third and fourth fore tarsal segments (fig. 15, *e*). The bases or more of mid and hind femora are darkened in *pilimana*. *A. boninensis* differs from *lobokensis* in the hairing of the fore tarsi and in having pruinescent instead of shiny parafrontals and occiput.

38. Atherigona neoatripalpis Snyder, new species (figs. 16, *d*; 17, *b*; 18, *b*; 19, *b*).

Male: 2.9 mm. long. Head fuscous, grayish pruinescent. Frontal vitta velvety seal brown. Back of head with a limited subshiny area between vertex and neck when viewed from above and behind. Antennal segment 2 brownish, margins slightly reddish, 3 large, black, gray pruinescent. Arista brownish basally, fuscous apically. Palpi slender, curved as in *sabroskyi*, brown, apex whitish yellow.

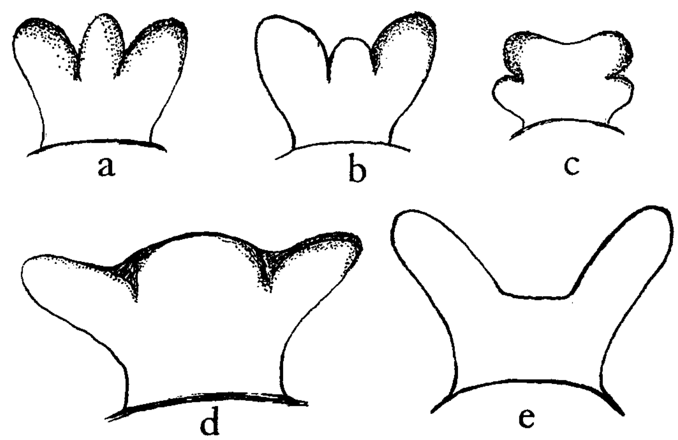


FIGURE 19.—Trifoliate processes, male, ventral view: **a**, *Atherigona tobi*; **b**, *A. neoatripalpis*; **c**, *A. sabroskyi*; **d**, *A. boninensis*; **e**, *A. oryzae*.

Thorax fuscous, yellowish gray pruinescent. Humeri with dense golden-yellow pruinescence; with a very faint trace of an indistinct brown streak in midline just behind transverse suture.

Fore legs, except yellow coxae and trochanters, missing in the single male specimen. Mid and hind legs yellow, basal two or three tarsal segments somewhat brownish. Bristled as in *sabroskyi*.

Wings, calyptrae, and halteres also as in *sabroskyi*.

Abdomen shaped as in *oryzae*; yellow, with sparse grayish pruinescence on segment 1 and more piceous pruinescence on 2 and 3, especially on 2. Segment 1 unmarked; 2 with a narrow brown median streak and a large elongate oval brown spot laterad to midline and with indications of a large, expansive shiny bare area on each tergite below; 3 with a pair of round brown spots and a faint trace of a median brown line. Hypopygial prominence, and trifoliate processes as in figures 16, *d*; 17, *b*; 18, *b*; 19, *b*.

Female: 3.4 mm. long. Similar to male. Palpi slightly longer, more slender, apical spot yellowish fulvous, extending basad almost to middle, though posterior margin is not so clearly defined. Remainder as in female of *sabroskyi.*

Holotype, male (US 67179), Palau Is., Babelthuap I., Ngardmau, May 10, 1957, Sabrosky; allotype, female (US), topotypical, Ngiwal, May 20, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

The description was prepared before relaxing the single male and its subsequent discoloration.

This species is probably closely allied to *atripalpis* Malloch [1925, Dept. Agric. India, Ent. Ser., Mem. 8 (11) : 116, pl. 7, fig. 7, *a-e*] as indicated by the shape of the trifoliate process. The palpi of *atripalpis* are entirely black with "dense pale woolly hairs" at tips; in *neoatripalpis* the palpi are not "obliquely truncated" and lack the dense, woolly hairs.

39. Atherigona vita Snyder, new species.

Female: 4.6-4.9 mm. long. Head: fuscous except fulvous cheeks and parafacials; all parts overlaid with gray pruinescence, except parafrontals which are seal-brown pruinescent, and the velvety fuscous-brown frontal vitta. Many of the more dorsal setae in postocular row arise from round, brown spots. Antennae black; thickened basal portion of arista pale yellow, blending to fuscous apically; short pubescent. Palpi moderately broad, fuscous; as long as anterior to posterior length of oral cavity.

Thorax fuscous, apex of scutellum fulvous. Pleura entirely gray pruinescent except for a seal-brown, pruinescent, dorsal, horizontal stripe which joins a similarly colored perpendicular posterior one on mesopleura; and on sides of humeri. Dorsum mostly seal-brown pruinescent except for irregular longitudinal gray pruinescent streaks which in various angles appear to divide dorsum into three to five broad, seal-brown pruinescent vittae. Many clothing setulae in gray area arise from small, round, brown spots and tend to make brown areas appear semiconfluent. Scutellum with a broad transverse seal-brown band at base, in sharp contrast to fulvous apex.

Legs: coxae, femora except knees, most of fore and hind tarsi, and apical 0.5 or more of *T3* fuscous; remainder of legs fulvous. *F1:* a complete row of *pd,* and an almost complete row of shorter *pv* bristles. *T1:* only apical *d, pd,* and *pv* bristles present. *F2:* one apical *p* bristle, and some of the hairs in *av* and *pv* series upright and distinct. *T2:* a median *p,* and an apical *d, av,* and *v* to *pv* bristle. *F3:* a few of the *av* setulae beyond middle more distinct than usual. *T3:* usual short submedian *pd, ad,* and *av* and apical *d* bristles. Tarsi not modified in shape or bristling. Claws and pulvilli moderately well developed.

Wings hyaline, scarcely tinged. Third and fourth veins not strongly convergent. Calyptrae hyaline, but strongly tinged with brown, though in certain angles they appear almost opaque; halteres yellow, knobs white.

Abdomen fuscous; seal-brown pruinescent except for an irregular narrow gray pruinescent vitta on each side of midline, and basolateral corners of tergites 2 to 4, but in these areas clothing setulae arise from round brown spots.

Holotype, female (US 67180), Not (Net), Palieij, Ponape, Jan. 16, 1948, Hurlbut, with a label "16-9"; paratype, female, Ponape I., Colonia, July 9, 1949, Owen.

DISTRIBUTION: Caroline Is. (Ponape).

I suspect that the unknown male will lack a hypopygial trifoliate process as well as a dorsal excavation on *F1.*

40. Atherigona ? laeta Wiedemann.

? *Coenosia laeta* Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 440.

Female: 3.2 mm. long. Face and perioral region pale, densely gray pruinescent; occiput shiny black except for a dense gray pruinescent, narrow peripheral margin. Frontal vitta velvety black except for a narrow fulvous-yellow region at base of antennae; parafacials subshiny to shiny black except opposite ocellar triangle and at juncture with gray pruinescent parafacials. Inner and outer vertical bristles strong, subequal.

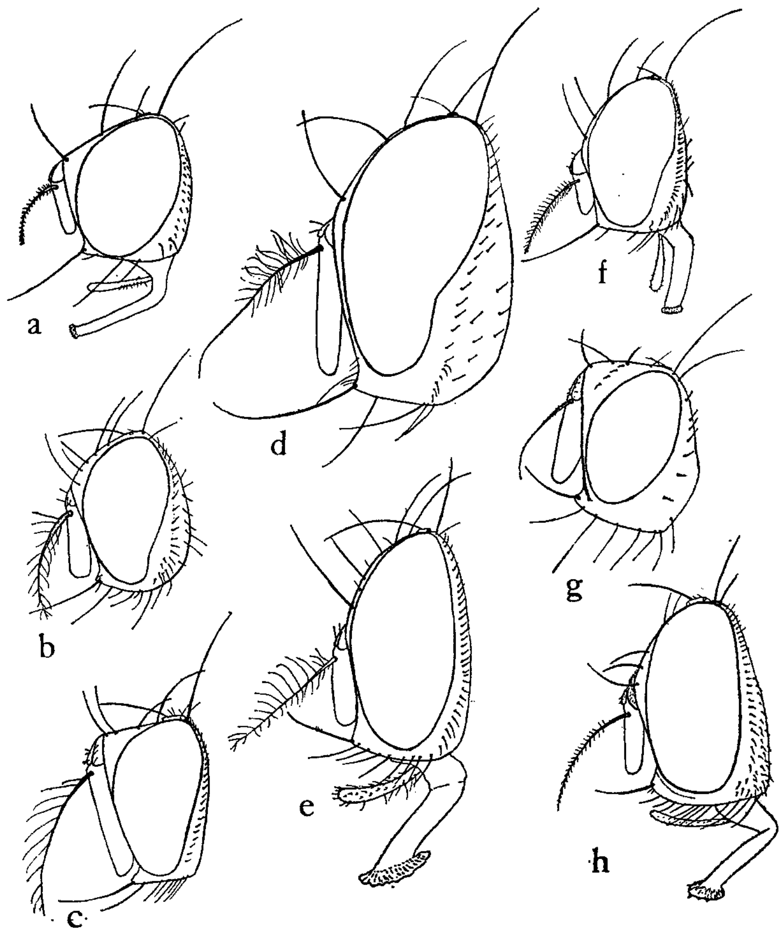


FIGURE 20.—Head profiles: **a,** *Orchisia costata,* male; **b,** *Pectinaseta prominens,* female; **c,** *P. prominens,* male; **d,** *Pygophora lobata,* male; **e,** *Dichaetomyia apicalis,* female; **f,** *Parvisquama ciliata,* male; **g,** *Limnophora extincta,* male; **h,** *L. plumiseta,* male.

Antennal segment 2, and 3 at its base, brownish fulvous; remainder of 3 fuscous brown. Palpi slender, distinctly curved; yellow.

Thoracic pleura and humeri yellow, sparsely yellowish white pruinescent; dorsum blackish, subshiny to sparsely gray pruinescent; mesonotum with three indistinct narrow brown vittae. Declivities and ventral surface of scutellum brownish fulvous.

Legs fulvous except for brownish fuscous *T1, T3,* fore tarsi, and a brownish apical spot on *F1. F1* with two or three weak preapical *pd* and a longer preapical *pv*. Basal three fore tarsal segments stout in profile, at least 2.0 times as large as corresponding ones on mid and hind legs.

Wings hyaline; third and fourth veins subparallel apically; anterior cross veins inserted about opposite apex of subcosta; posterior cross vein perpendicular. Calyptrae whitish hyaline; halteres yellow.

Abdomen shiny fulvous with a large dark median spot on visible tergites 1 and 4, and a pair of smaller ones on 2 and 3.

DISTRIBUTION: Caroline Is. (Palau).

PALAU. BABELTHUAP: Female, Ngerehelong, May 1957, Sabrosky. PELELIU: Female, Mt. Amiangl, Dec. 1952, Gressitt. NGESEBUS: Female, May 1957, Sabrosky.

Until males of this species from Micronesia are available, I identify the above three females questionably as *laeta* Wiedemann, basing the identification on Malloch's key and notes (1928, Ent. Mitteil. **17**: 301, 313). *A. laeta* is an oriental species.

Genus **Lispe** Latreille

Lispe Latreille, 1796, Précis des characteres génériques des Insectes, 169.—Snyder, 1954, Am. Mus. Novitates **1675**: 5.—Hennig, 1960, IN Lindner, Flieg. Palaearkt. Reg. Lief. 209, Muscidae, **63**, b: 399.

Lispa Malloch, 1925, Australian Zool. **3** (8) : 333; 1929, Insects of Samoa **6** (3) : 153.—Karl, 1935, Arb. Morph. Tax. Ent. Berlin-Dahlem **2** : 43.

Type species: *L. tentaculata* de Geer.

Front at narrowest part in both sexes 0.25 or more of greatest head width. Palpi distinctly broader apically than basally. Parafacials often hairy above vibrissae and below anterior parafrontal bristles. Face usually slightly constricted opposite or below apex of antennal segment 2. Pteropleura hairy or setose; *st* 1: 2, not in an equilateral triangle. Sixth and seventh wing veins subequal in length, subparallel, and extending almost to margin of wing.

Adults are wary and adroit in avoiding capture; they blend quite well with the general background. I suspect that there are more *Lispe* in Micronesia than the few species present in this collection, and more specialized collecting along margins of brackish pools, and edges of fresh-water inland streams on the larger islands and raised atolls should yield more species, and many more specimens.

Adults are commonly encountered along with ephydrids in the environments noted above. The complete life cycle of no species has been fully studied or described, and in only a few Holarctic and Palaearctic species have one or more of the larval instars been figured. Lamborn (1920, Bull. Ent. Research **11**: 279-281) and Cuthbertson (1937, Rhodesian Sci. Soc., Trans. **35**:23) have reported that adults of several African species are predaceous on *Anopheles* larvae, pupae, and emerging adults. Travis (1947, a) has described

similar habits of several acalyptrate genera on Guam and Guadalcanal; it is possible that one or more of the Micronesian lispine species may have similar habits, though I did not observe it in species from the Bonin Islands.

Key to Micronesian Species of Lispe

1. Apical portion of fourth vein curved forward (fig. 21, *b*)........2
   Apical portion of fourth vein subparallel with third........3

2(1). Clothing setulae and hairs on *a* to *v* surfaces of *F2* decumbent, inconspicuous (fig. 21, *a*); male, *T1* with a median *pv* to *v* bristle........**42. incerta**
   Clothing setulae or hairs on *av* to *pv* surfaces of *F2* long and conspicuous, especially in males (fig. 10, *e*); male, *T1* without a median bristle........**41. assimilis**

3(1). Palpi dark brown to fuscous; anterior two pairs of *presut dc* weak, and subequal to short anterior two pairs of *postsut dc*; posterior two pairs of *postsut dc* strong. Male enlarged abdominal sternite 4 usually obscures very small V-shaped sternite 5........4
   Palpi yellow to fulvous; *dc* 2:3, subequal. Male abdominal sternite 4 normally does not obscure large and variable-shaped sternite 5........5

4(3). Male and female: *F3* relatively short, stout. Face golden to grayish yellow, not sharply contrasting with cheeks. Male abdominal sternite 4 normal at apex (fig. 22, *i*)........**43. pumiloides**
   Male (female unknown): *F3* long and slender. Face brownish fuscous, lower margin sharply defined and in distinct contrast to yellowish to golden part of face and entire cheeks. Abdominal sternite 4 with a distinct, median apical, setulose enlargement (fig. 22, *a*)........**44. haha**

5(3). Sides of palpi gradually divergent (fig. 21, *e*); margins of calyptrae darkened. Male hind metatarsus normal........**45. boninensis**
   Sides of palpi abruptly divergent apically (fig. 21, *d*); calyptrae entirely white. Male hind metatarsus conspicuously enlarged (fig. 21, *c*)........**46. albifacies**

41. Lispe assimilis Wiedemann (figs. 10, *e*; 21, *b*; 22, *e*; 23, *b*; 24, *e, g, i*).

Lispe assimilis Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 444.—Stein, 1909, Tijdschr. Ent. **52**: 256, 265; 1913, Mus. Nat. Hungarici, Ann. **11**: 550; 1915, Suppl. Ent. **15**: 45.—Malloch, 1925, Australian Zool. **3**: 335, 337, 338; 1928, Insects of Samoa **6** (3): 153.—Hennig, 1960, IN Lindner, Flieg. Palaearkt. Reg., Lief. 209, Muscidae **63**, b: 420.

Male: Head black, grayish pruinescent; cheeks yellowish, and parafrontals yellowish gray anteriorly, blending to brownish fuscous posteriorly; frontal vitta velvety fuscous brown; narrowly complete triangle brownish. Front at vertex 0.45 of head width, gradually narrowed to 0.40 opposite antennal segment 2. Parafrontals with two or three irregular rows of decumbent hairs laterad of row of convergent bristles. Parafacials with only a few very short, fine hairs on lower 0.25 to 0.33. Vibrissae strong. Cheeks with a row of short marginal bristles. In profile, juncture of parafacials and parafrontals protruding anteriorly for a distance almost as great as width of antennal segment 3; parafacials only slightly narrower below. Cheeks subequal in height. Antennae inserted opposite dorsal 0.3 of eyes and extending to opposite their lower margin, fuscous; apex of segment 2 fulvous; segment 3 is 1.9 to 2.0 times as long as 2. Palpi yellowish to fulvous yellow, sides distinctly divergent, similar to figure 21, *d*. Mentum shiny black.

Thorax black, gray pruinescent; dorsum with three narrow brown vittae and traces of brownish pruinescence in *ia* plane; *dc* 2:4, only the two posterior *postsut* pairs long; *ac* 0:0, *presut* setulae in about eight rows between *dc*; *pra* absent or minute; *ia* 1 or sometimes with a second short anterior *postsut* hair or bristle; *st* 3, in an almost equilateral triangle, lower one sometimes weakly to strongly duplicated on one or both sides; preepisternum III bare; spiracles small, opercula yellowish, posterior one with numerous long, black, posterior setae.

Legs black, gray pruinescent; knees and base or more of femora brown to fulvous brown. Tarsi not unusually bristled or modified. *F1* with a row of *pd* and *pv* bristles; linear area above *pv* row without clothing setulae. *T1* without median bristles; only preapical *d* longer than *T1* diameter. *F2* stout on basal 0.5 to 0.6, gradually narrowed apically; with numerous long *av* to *pv* hairs (fig. 10, *e*); with two *p* bristles on apical 0.12. *T2* with one median *p*; apical *av* and *pv* long. *F3* with a strong preapical *av* and another near middle; *av* to *pv* clothing setulae somewhat longer, more numerous and hairlike than usual but not so prominent as on *F2*; with one or two *pv* at base as long as *F3* height. *T3* with a median *pd, ad,* and *av* bristle; preapical *d, ad* and *av* strong.

Wings hyaline, very faintly tinged. Fourth vein curved forward apically; posterior cross vein distinctly bowed (fig. 21, *b*). Calyptrae white, margins pale yellow; halteres yellow.

Abdomen elongate, oval, black; gray pruinescent. Visible tergites 2 and 3 with a pair of large subshiny, expansive black spots; 4 with a large median subshiny black triangle. Basal sternite hairy; sternite 2 with a pair of long apical bristles; 3 and 4 with sparse clothing hairs; sternite 5 with a deep narrow median incision and each process also with a shallow median incision (fig. 22, *e*); tergite 5 small, inconspicuous; basal hypopygial segment unmarked and inconspicuous. Hypopygium as in figures 23, *b*; 24, *e, g*.

Female: Similar to male. Parafacials somewhat more yellowish anteriorly, especially at their juncture with parafrontals. Antennal segment 3 not more than 1.5 times as long as 2.

T1 with a median *p* bristle. *F2* with *av* to *pv* hairs shorter and less numerous than in male but more conspicuous than in *incerta* Malloch and usually with a longer and more conspicuous *a* bristle on basal 0.5. *F3* without as longish hairs on *v* surfaces.

Tergite 4 narrowly fulvous apically and with a pair of expansive dark spots. Abdominal tergite 10 with a single pair of long bristles (fig. 24, *i*).

DISTRIBUTION: Java, Formosa, Ryukyu Is., Siam, Bonin Is.

BONIN IS. CHICHI JIMA: 42, Okumura, "Yankee Town," Apr., May, June 1958, Snyder.

All the Bonin Islands specimens were taken near mud puddles in roads or almost dry drainage ditches. In several specimens the lower *st* bristle is weakly to strongly duplicated on one or both sides and often there is a short adventitious median *a* to *av* bristle on *T3*; the apex of the scutellum is sometimes narrowly fulvous in the female; and the tibiae in both sexes vary from entirely fulvous to fulvous on only the basal 0.4. (See remarks under *incerta* Malloch.)

42. Lispe incerta Malloch (figs. 21, *a*; 22, *b*; 23, *e*; 24, *d, f*; 25, *a*).

Lispe incerta Malloch, 1925, Australian Zool. **3**: 337.—Lee, Crust, and Sabrosky, 1956, Linn. Soc. New South Wales, Proc. **80**: 321.

Lispe hilli Malloch; Lee, Crust, and Sabrosky, 1956, Linn. Soc. New South Wales, Proc. **80**: 319.

? *Lispe assimilis* var. *modesta* Stein, 1918, Mus. Nat. Hungarici, Ann. **16**: 175.

Male: Head black, grayish pruinescent except for black frontal vitta, brownish posterior 0.5 of parafrontals; narrowly complete, faint, frontal triangle, anterior 0.5 of parafrontals, and dorsal 0.25 of parafacials yellowish. Profile as in figure 25, *a*. Front at vertex 0.42 of head width, narrowed to 0.34 at base of antennae. Parafrontals: four or five inwardly directed bristles on anterior 0.8 which are about as long as outer verticals; a stronger posterior, outwardly and slightly backwardly directed pair on posterior 0.2; and two to three irregular rows of distinct hairs laterad to bristles. Parafacials with an irregular row of short hairs along their entire length. Juncture of parafacials and parafrontals as long as width of antennal segment 3, parafacials narrowed to 0.33 this distance below. Cheeks slightly higher than width of antennal segment 3. Eye facets slightly enlarged adjacent to juncture of parafacials and para-

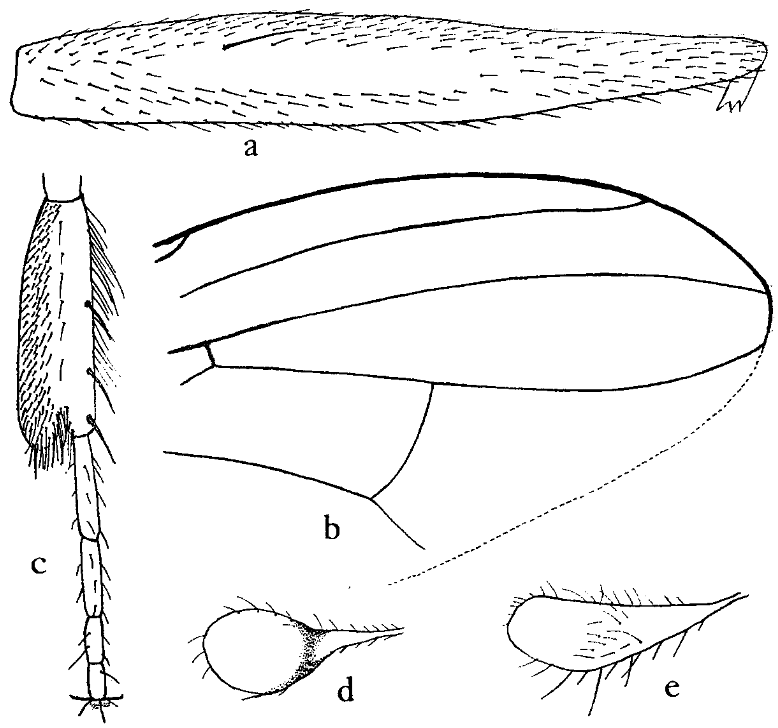


FIGURE 21.—**a,** *Lispe incerta,* male anterior surface of *F2*; **b,** *L. assimilis,* apex of wing; **c,** *L. albifacies,* male left hind metatarsus, dorsal view; **d,** *L. albifacies,* male palpus; **e,** *L. boninensis,* male palpus.

frontals. Antennae: fuscous, except for fulvous apex of segment 2; inserted opposite dorsal 0.36 of eyes and ending slightly above oral margin; segment 3 is 1.9 times as long as 2. Aristal hairs confined to basal 0.6, and more numerous on dorsal than on ventral surfaces; longest equal to width of antennal segment 3. Palpi yellow, sides gradually divergent so that at its widest part, width at apex is about six times as great as at base, or about equal to width of facial plate. Mentum shiny fuscous.

Thorax: black, grayish pruinescent; dorsum with an ill-defined median brown vitta which extends to tip of scutellum, and two more diffuse ones on each side of vitta. Dorsum bristled as in *pumiloides*. Anterior mesopleural bristle short, weak. Pteropleural hairs sparse. Preepisternum III and hypopleura bare.

Legs black, densely gray pruinescent except for reddish fulvous *T2* and variable basal portions of *T1* and *T3*. *F1* with an entire row of six to eight short *d* to *pd* bristles and a row of three to five *pv* on apical 0.5; basal 0.5 of *pv* surface bare or with short and weak setulae and frequently with a conspicuous bare area devoid of clothing setulae below the median *p* row of clothing setulae and also along central portion of *a* surface. *T1:* a short median *p*; apically an *ad*, *pd* and *pv* to *v*, all at least as long as *T1* diameter. *F2* distinctly attenuated on apical 0.33; a strong *a* bristle on basal 0.33 and a few much shorter setulae basad and beyond it; with a single row of short *av* to *v* setulose hairs, longest subequal to narrowest apical diameter of *F2* (fig. 21, *a*) and with an apical and preapical *p* bristle. *T2* with one median *p*. *F3:* a stout *av* beyond middle, a shorter but well-developed preapical one; and a few longish basal *p* hairs. *T3:* a submedian *ad*, *av*, and *pd* bristle; apical *d*, *p*, and *pv* to *v* bristles well developed. Tarsi not unusually modified; apical fringe of hairs on segment 5 longer than others, but only those on the fore pair approach length of this segment.

Wings grayish hyaline, veins fulvous brown to brown; all bare except costa. Third and fourth strongly convergent; the fourth distinctly curved forward at apex. Calyptrae subhyaline, white, margins faintly yellow; halteres yellow.

Abdomen: black, sides and venter densely gray pruinescent; dorsum with an extensive trapezoidal, shiny, black spot on visible tergites 1 to 4; basal lateral subtriangular portion of each tergite densely gray pruinescent; spots on tergites 2 and 3 divided medianly by a narrow gray pruinescent vitta; basal hypopygial segment entirely grayish pruinescent. Basal sternite setulose; sternite 2 with a pair of strong apical bristles, 3 and 4 with clothing hairs only; 4 ends about opposite apex of tergite 3; sternite 5 not obscured by 4 and with a moderately deep, but narrow V-shaped incision. Lobes of lateral processes with a distinct median notch (fig. 22, *b*). Apex of sternite 5, and ventral apical margins of tergites sometimes fulvous. Hypopygium as in figures 23, *e*; 24, *d*, *f*.

Female: Similar to male. Pruinescence on face and cheeks more yellow; frontal triangle more prominent. Wings slightly tinged with light brown. *F1:* *a* bare strip not quite as extensive, but *p* strip more clearly defined than in male; *pv* bristles not clearly divided into a long *a* and a short *p* series. Abdominal tergite 4 with a dorsal median spot more hourglass-shaped, and invaded by a short pruinescent triangle at apex.

DISTRIBUTION: Australia, India, Samoa, New Hebrides, Solomon Is., New Caledonia, and Caroline Is.

PALAU. 20. BABELTHUAP: Apr. 1957, cacao, Sabrosky; Ameliik, Apr. 1954, Beardsley; Ngerehelong, May 1957, Sabrosky; Airai, Ngarsung, May 1957, Sabrosky; Ngiwal, May 1957, Sabrosky. KOROR: Aug., Dec. 1952, Beardsley.

YAP. 12. YAP: Oct. 1952, Krauss; Ruul Dist., July, Aug. 1950, Goss; Kolonia, Mar., June 1954, 1957, Beardsley, Sabrosky. RUMUNG: June 1957, Sabrosky.

This species is very closely related to the Ethiopian *L. modesta* Stein (1913, Mus. Nat. Hungarici, Ann. **11**: 551) and may prove to be only a subspecies of it. However, the limited African material I have studied indicates there are slight differences in the shape of the processes of the male fifth abdominal sternite in the two. Females are impossible to distinguish at present.

These two species, and *assimilis* Wiedemann, *glabra* Wiedemann, *cyrtoneurina* Stein, *cilitarsis* Loew, *longicollis* Meigen, *nuba* Wiedemann, *barpipes* Stein, *weschei* Malloch, and *xenochaeta* Malloch have the fourth vein curved

forward. While males are separable, females are, with a very few exceptions, very difficult to identify.

It is quite possible that some Oriental and Australian records of *modesta* and *assimilis* are in reality of *incerta.*

43. Lispe pumiloides Snyder, new species (figs. 22, *f, i, j*; 23, *c*; 24, *c, h*).

Male: 5.0 to 5.6 mm. long. Head: black; occiput, except a variable subshiny dorsal portion, and cheeks gray pruinescent; face, parafacials, and anterior 0.5 of parafrontals yellow pruinescent; frontal vitta subshiny black, the indistinct brown ocellar triangle extends to base of antennae. Front at vertex 0.330 of head width, broadened to 0.382 at middle of front, and then narrowed to 0.356 at base of antennae; face at its narrowest part (opposite juncture of antennal segments 2 and 3) equal to frontal width at vertex. Parafrontals: four pairs of irregular, convergent bristles on anterior 0.67, and two pairs of posterolaterally directed bristles, anterior pair of these shorter than posterior pair, but not hairlike; with an irregular double row of lateral parafrontal hairs which extends ventrally onto dorsal 0.10 to 0.15 of parafacials. Parafacials: short, fine hairs along most of their length, but becoming somewhat stronger ventrally. In profile, juncture of parafacials and parafrontals as long as greatest width of antennal segment 3; parafacials narrowed below but, nevertheless, distinct along their entire length. Cheeks as high as width of antennal segment 3. Antennae black, articulation of segments 2 and 3 brownish red; inserted opposite dorsal 0.27 of eyes, and ending slightly above their lower margin; segment 3 is 2.9 times as long as 2. Arista dark; plumose on basal 0.75, longest hairs on both surfaces, including aristal diameter, equal to length of antennal segment 3. Palpi fuscous brown, gradually broadened apically; widest part about three times broader than base.

Thorax: black; pleura, a dorsolateral area from humeri to postalar declivities and sides of scutellum grayish pruinescent; mesonotum mostly subshiny black, but with a pair of narrow, indistinct brownish pruinescent vittae somewhat mesad to *dc* rows, and a rather long triangular grayish vitta on each side which extends from base of scutellum to opposite anterior, strong *postsut dc* bristle and is situated between *dc* and *ia* planes. Prescutellar *ac* hairs very weak or absent; one or two weak anterior, and one strong posterior *presut dc* bristles; two pairs of hairlike anterior, and two strong posterior, *postsut dc* bristles; *ia* 2, short and slender; *pra* absent; *st* 1:2; anterior mesopleural bristle present, but often quite short; preepisternum III with a few dark hairs. Hypopleura bare.

Legs black, grayish pruinescent; entire *T3, T2,* and base of *T1* fulvous. *T1:* apical *d* slightly longer, and *pv* about equal to *T1* diameter; these are the only *T1* bristles. *F2:* a single *a* and one or two *av* submedian bristles, and a row of four to six slender *v* to *pv* bristles on basal 0.5. *T2* with a short submedian *p*. *F3:* two *av* bristles on basal 0.5 to 0.6 and a shorter preapical one; a similar *pv* series, but these shorter, more slender, and with a submedian and a preapical *pv* bristle. *T3:* a median *ad* and *av* bristle; apical *d* 2.0 to 3.0 times as long as *T3* diameter; apical *ad* and *av* slightly longer than *T3* diameter, and *a* slightly shorter. Tarsi not modified; apical fringe of hairs on segment 5 slightly longer than segment.

Wings: hyaline, faintly tinged. All veins bare except costa; third and fourth subparallel apically, or very slightly convergent and fourth not curved forward apically. Calyptrae whitish or very faintly tinged, their margins slightly yellowish; halteres fulvous.

Abdomen: elongate, subcylindrical. Black in ground color though sometimes sides and ventral portion of tergites have a very narrow fulvous apical shadow. A pair of large, brownish spots on dorsum of each tergite and these extend to, but do not invade, sides but are apically divided at midline by an incomplete, triangular, grayish pruinescent spot. Sides and lower surface of tergites gray pruinescent except a round brown spot on sides of tergites 3 and 4. Basal sternite bare; a strong pair of apical bristles on sternite 2; only clothing hairs on 3 and 4. Abdominal sternite 5 very small,

somewhat V-shaped (fig. 22, *f*), and not visible because of overlapping of tip of large sternite 4 (fig. 22, *i*) and apices of the superior forceps (fig. 23, *c*). When terminalia are dissected, a complicated internal structure (fig. 22, *j*) is found attached to base of sternite 5.

Female: 5.2 mm. long. Vertical proportions same as in male, but front broadened to 0.41 at widest part, and face narrowed to 0.39 of greatest head width. Setulae on scutellum descend somewhat more ventrad on declivities, but none quite reach ventral margins. Anterior *ia* weak, or absent. *T1,* a short but distinct apical *a* in addition to *d* and *pv* bristles. *F2* without distinct *v* to *pv* bristles. *F3* with a single preapical *av*; without *pv*. *T3,* all apical bristles stronger than those in male except *a* and it is scarcely differentiated. Pulvilli and claws smaller, and apical fringe of hairs on tarsal segment 5 shorter than in male.

Dark abdominal spots on tergites 2 and 3 extend onto sides in the form of a basal band; a spot on each side of tergite 4 is probably connected to dorsal mark by a narrow band. Median dorsal gray pruinescent spot on tergite 4 complete. Clothing setulae on sternites longer and more prominent than in male. Sternites 3 and 4 as long as their respective tergites. With a single bristle (fig. 24, *h*) on each side of tergite 10 (basal segment of ovipositor).

Holotype, male (US 67181), Giliman, Yap I., June 12, 1957, Sabrosky; allotype, female (US), one female paratype, same data as type; paratypes (BISHOP, US, CAS, KU): male, Ruul Distr., Yap I., July-Aug. 1950, Goss; male, female, Yap, Nif-Guilifez, Sept. 7, 1939, Esaki; male, Yap I., Oct. 1952, Krauss; male, Yap, Mar. 28, 1954, Beardsley; male, Kolonia, Yap I., June 8, 1957, Sabrosky; female, Yap I., Mar. 28, 1954, Beardsley; two females, Palau, Koror I., Dec. 1952, 1953, Beardsley; female, Angaur I., Mar. 1953, Owen; female, Dugor, Yap, Mar. 1-8, 1949, sweeping water hyacinths, Maehler; male, Kolonia, Yap, sweeping water hyacinth, Maehler.

DISTRIBUTION: Caroline Is. (Palau, Yap).

Superficially, this species resembles *pumila* Wiedemann to which it will trace in Malloch's key to Australian species [1925, Australian Zool. **3** (8): 333] but differs in not having palpi and base of third and apex of second antennal segments fulvous. The *F2* in *pumila* lacks a strong preapical *av* bristle.

44. Lispe haha Snyder, new species (fig. 22, *a*).

Male: 4.5 mm. long. Head: black; gray pruinescence of occiput with changeable dorsolateral reflections; pruinescence on cheeks and oral margins yellow, on facial plate and facial ridge seal brown, on middle of parafacials light brown and on upper part of parafacials adjacent to their juncture with anterior 0.33 of parafrontals, yellowish. Remainder of parafrontals and frontal vitta dull velvety black and very sparsely grayish pruinescent. Ocellar triangle not clearly defined but at certain favorable angles of vision, barely traceable to base of antennae. Front at vertex 0.375 of head width, narrowed to 0.344 at base of antennae; narrowest part of face (opposite dorsal 0.25 of antennal segment 3) is 0.312 of head width. Parafrontals: a pair of short anterior, and median convergent bristles; and two pairs of backwardly and outwardly directed posteriors of which anterior pair is very short and almost hairlike. Sides of anterior 0.5 of parafrontals and median 0.66 of parafacials with an irregular row of a few very short hairs. Inner verticals about twice as long and strong as anterior ocellars, latter subequal to anterior parafrontals; outer verticals subequal to anterior ocellars; postocellars short, but distinct. In profile, juncture of parafacials and parafrontals as long as width of antennal segment 3; parafrontals narrowed below. Cheeks 0.5 as high as length of antennal segment 3. Antennae black, apex of segment 2 brownish; inserted

opposite dorsal 0.40 of eyes and terminating opposite their lower 0.12; segment 3 is 1.8 times as long as 2. Arista haired on basal 0.67, longest hairs slightly longer than greatest width of antennal segment 3. Palpi black, slightly brownish at base; apex rounded and, at its widest part, about four to five times basal diameter, or about as wide as width of antennal segment 3. Mentum shiny fuscous brown. Eyes bare, strongly emarginate posteroventrally.

Thorax black; pleura densely gray pruinescent; dorsum (slightly greased and *postsut* portion largely obscured by pin and verdigris) appears to be subshiny black on sides; only following presutural bristles: one anterior supraalar; one humeral, and

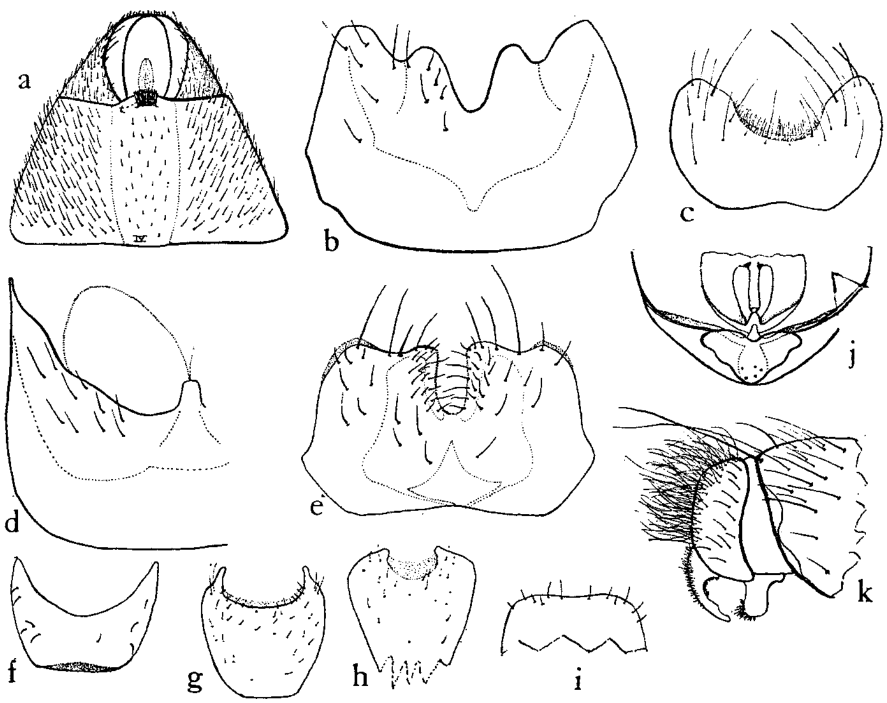


FIGURE 22.—**a,** *Lispe haha,* male apex of abdomen, ventral view (t, apical tuft; IV, fourth abdominal sternite). **b-h,** male fifth abdominal sternite, ventral view: *b, L. incerta*; *c, L. albifacies*; *d, L. boninensis*; *e, L. assimilis*; *f, L. pumiloides*; *g, Gymnodia marguerita*; *h, G. expansa.* **i,** *Lispa pumiloides,* male fourth abdominal sternite, ventral view; **j,** *L. pumiloides,* male internal structure of fifth abdominal sternite, dorsal view; **k,** *L. boninensis,* male apex of abdomen, lateral view.

two *ntpls.* Two strong prescutellar *postsut dc*; one supraalar; basal and apical scutellars strong. *St* 1:2. A few short dark hairs on preepisternum III, remaining portions of hypopleura bare. Pteropleural setulae dark, numerous; without mesopleural bristles adjacent to anterior *ntpl.*

Legs: black; coxae, femora, and tibiae densely gray pruinescent. *T1* fulvous on extreme base, *T2* and *T3* mostly fulvous, but blend into light brown apically. *T1* slightly thickened dorsoventrally, clothing setulae closely placed and numerous on *d* to *a*, and *v* to *pv* surfaces; and a single *pd* to *p* series of short clothing setulae; apical *d* and *v* bristle longer than *T1* diameter; apical *av* distinct, but shorter than *T1* diameter; without other *T1* bristles. *F2:* a very short *a* on basal 0.33, and a slightly stronger apical *p*; no other

F2 bristles. *T2:* one short median *p* to *pd* bristle, and usual apicals. *F3: ad* series very short, a single very long median *av* and a short preapical *pv*. *T3:* a median *ad* and four equally long hairs beyond; a very short median *pd*, which is subequal to apical *av*.

Wings hyaline, veins brown, third and fourth subparallel apically. All veins except costa bare. Halteres yellow to fulvous; calyptrae white.

Abdomen black; dorsum of first visible tergite with a pair of dense gray pruinescent trapezoidal spots; tergite 2 with an extensive basolateral gray spot; 3 same as 2 except a gray median vitta interrupts central dark trapezoidal spot; 4 with a pair of round, gray spots. Laterally, gray pruinescent spots do not descend below middle of sides of tergites; ventral portions velvety brown. Sternites fuscous, sparsely gray pruinescent; basal one densely setulose. Sternite 4 fused with tergite 4, prominent and bearing an oval, slightly elevated median apical area which is covered with dense decumbent setulae (fig. 22, *a*); remaining clothing setulae of sternite 4 normal, short, and dispersed. Sternite 5 concealed. Hypopygium velvety black.

Holotype, male (Nat. Inst. Agric. Sci., Tokyo), Ogasawara, Haha Jima, 1931, Motoike and Ise. The reverse side of the locality label bears a "7" and what appears to be two Japanese characters.

DISTRIBUTION: Bonin Is. (Haha Jima).

45. Lispe boninensis Snyder, new species (figs. 21, *e*; 22, *d*, *k*; 23, *a*; 24, *b*).

Male: 6.0-6.5 mm. long. Head fuscous; face, including entirely fine-haired parafacials, yellow to golden yellow pruinescent. Cheeks and back of head gray pruinescent. Frontal vitta dark, ocellar triangle very narrowly complete, slightly yellowish; narrow parafrontals yellowish anteriorly, blending to fuscous pruinescent posteriorly, and with numerous short hairs laterad to row of three to five bristles. Front at vertex 0.40 to 0.48 of head width, slightly broader at middle of front, then narrowed to vertical width opposite middle of antennal segment 2. In profile, juncture of parafacials and parafrontals not projecting anteriorly more than maximum width of antennae, and parafacials only slightly narrower below. Cheeks 1.25 to 1.50 times as high as greatest width of antennal segment 3. Antennae fuscous, apex of segment 2 and base of 3 narrowly yellow to fulvous, inserted slightly above middle of eyes; segment 3 is 2.00 to 2.25 times as long as 2. Palpi yellow, sides gradually divergent from base to widest preapical portion (fig. 21, *e*). Vibrissae strong.

Thorax black, grayish pruinescent; dorsum with five narrow, indistinct, fuscous brown vittae, none of which extends onto scutellum. *Ac* in five to nine irregular rows between planes of 2: 3 *dc*. Opercula of spiracles small, yellow to fulvous and only one or two long dark hairs in hind margin of posterior pair. Hypopleura bare. *St* 3, in a nearly equilateral triangle.

Legs fuscous, gray pruinescent; tibiae and tarsi fulvous, irregularly blending into brown or fuscous apically. *F1* normal. *T1* without median bristles; apical *d* and *pv* longer than *T1* diameter. *F2* stout; four to seven *av* and *pv* setae and a strongish submedian pair and often a much shorter third one basad or beyond; two preapical *p*. *T2* with a *p* near middle; apically to preapically only *a*, *v*, and *p* bristles strong. *F3* with a row of shortish irregular *av* and *pv* setae on basal 0.6 to 0.8. *T3* with only a *pd* near middle; apical *d*, *ad* and *av* strong. Tarsi not unusually modified; pulvilli and claws well developed and tarsal segment 5 of each with a few longish setae.

Wings faintly tinged, third and fourth veins parallel apically; posterior cross vein perpendicular. Calyptrae hyaline, their margins darkened; halteres yellow to fulvous.

Abdomen dark; gray pruinescent. Dorsum with irregular expansive subshiny dark triangles which are narrowly separated by an irregular, gray pruinescent vitta on tergites 1 to 4. Larger bristles on sides and lateral declivities surrounded by subshiny black spots on at least tergites 3 and 4. Basal sternite hairy, 1 and often 2 with a pair of preapical bristles; 5 entire, with a median V-shaped incision, and narrow attenuated lateral processes (fig. 22, *d*). All tergites with distinct median and apical bristles on sides. Basal hypopygial segment with long fine hairs which are somewhat crinkled at their ends (fig. 22, *k*). Hypopygium as in figures 23, *a*; 24, *b*.

Female: 6.3-6.8 mm. long. Similar to male; abdominal marks more expansive and less well defined. *F3* with *av* and *pv* shorter. Abdominal tergite 10 with about four long hairs in addition to pair of strong dorsal bristles.

Holotype, male (US 67182), allotype, female (US), paratypes: female, 13 males, Bonin Is., Haha Jima, Okimura, Apr. 26-June [error for May] 9, 1958, Snyder. Other paratypes (BISHOP, US): six males, Chichi Jima: "Camp Beach," Apr. 2-25, 1958; four males, Ogiura, Apr. 8 to May 12, 1958; two

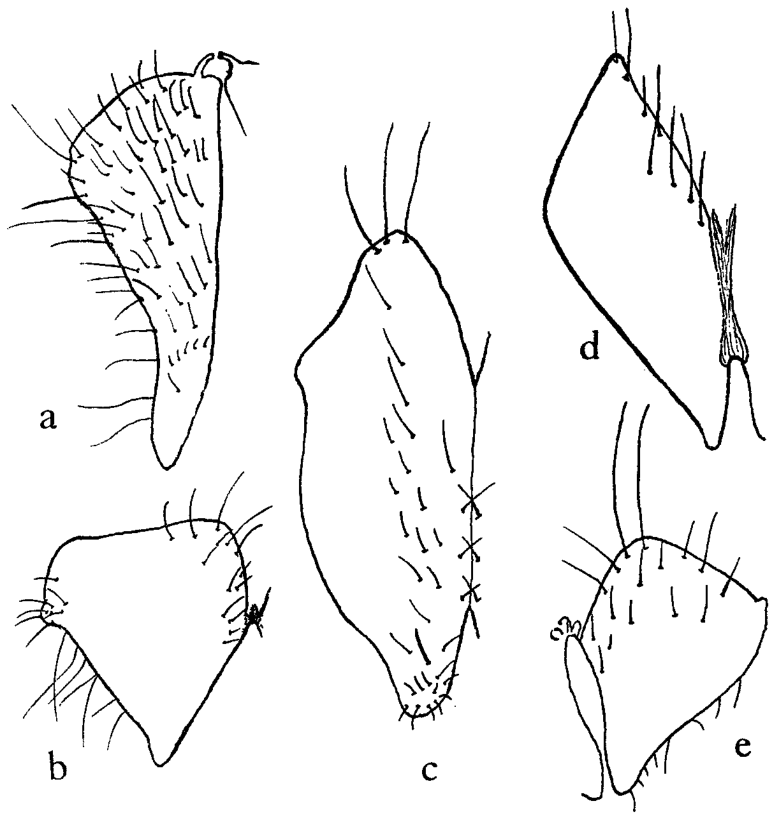


FIGURE 23.—Male superior forceps, ventral view: **a**, *Lispe boninensis*; **b**, *L. assimilis*; **c**, *L. pumiloides*; **d**, *L. albifacies*; **e**, *L. incerta.*

males, Ani Jima, S.W. Bay, May 17, 1958, all Snyder.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima).

46. Lispe albifacies Malloch (figs. 21, *c, d*; 22, *c*; 23, *d*; 24, *a*).

Lispe albifacies Malloch, 1929, Insects of Samoa **6** (3): 154.

Male: Head black, densely gray to silvery gray pruinescent; front and facial stripe yellowish brown in certain angles; parafacials reduced to a narrow line which is visible only from side and above; irregular row of parafrontal bristles inserted very close

to eye margin and with only two to four short accessory lateral hairs anteriorly. Front at vertex 0.37 of head width, narrowed to 0.33 at base of antennae and to 0.26 opposite apex of antennal segment 2. Parafacials with a few fine hairs only on ventral 0.2 to 0.3. In profile, juncture of parafacials and parafrontals projecting anteriorly slightly more than width of narrow antennal segment 3, and parafacials narrowed to

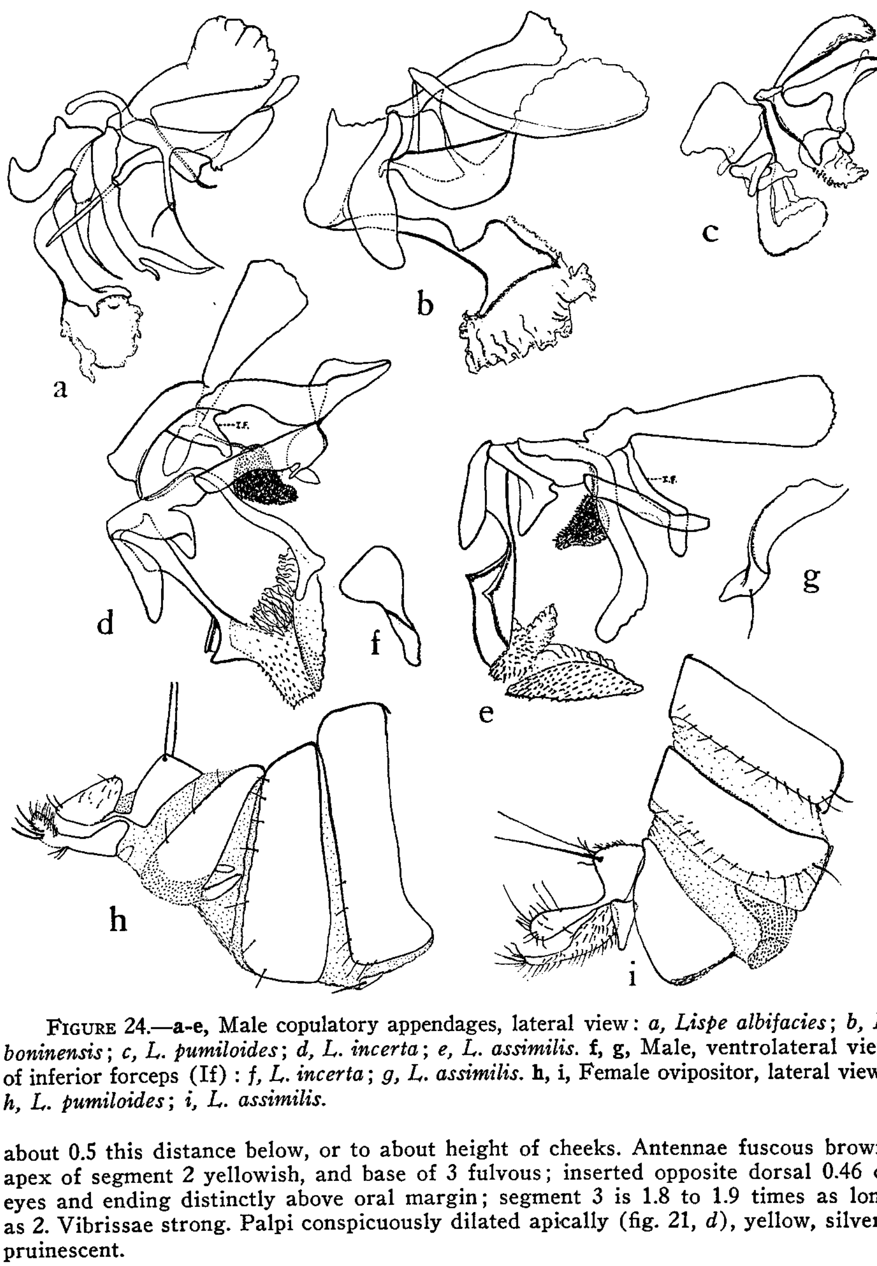


FIGURE 24.—**a-e**, Male copulatory appendages, lateral view: *a, Lispe albifacies*; *b, L. boninensis*; *c, L. pumiloides*; *d, L. incerta*; *e, L. assimilis*. **f**, **g**, Male, ventrolateral view of inferior forceps (If): *f, L. incerta*; *g, L. assimilis*. **h**, **i**, Female ovipositor, lateral view: *h, L. pumiloides*; *i, L. assimilis*.

about 0.5 this distance below, or to about height of cheeks. Antennae fuscous brown, apex of segment 2 yellowish, and base of 3 fulvous; inserted opposite dorsal 0.46 of eyes and ending distinctly above oral margin; segment 3 is 1.8 to 1.9 times as long as 2. Vibrissae strong. Palpi conspicuously dilated apically (fig. 21, *d*), yellow, silvery pruinescent.

Thorax bluish black, gray pruinescent; with faint traces of sparse yellowish pruinescence in *ac* plane. Scutellum brownish black, subshiny to sparsely pruinescent. *Dc* 2:3; posterior *ntpl* shorter than anterior one; anterior mesopleural bristle absent; hypopleura and preepisternum III bare; *st* 3, in a nearly equilateral triangle. Spiracles small, their opercula dark, and with only one or two longish adventitious hairs along posterior margin of hind pair.

Legs black, gray pruinescent, knees narrowly, and base of tibiae variably fulvous; fore tarsi entirely and mid tarsi mostly fulvous. *F1* with a complete row of *pd* and *pv* bristles. *T1* without median bristles; apical *d, pd,* and *pv* bristles long; dorsal most prominent. *F2* attenuated apically, with two or three slender, longish *v* hairs on basal 0.5; without prominent *a* or *av* bristles. *T2* with a long submedian *p*; preapical *ad* long and prominent, situated at about apical 0.18, and subequal to *av, v,* and *pv* subapical bristles. *F3* with two to four *pv* on basal 0.4 and sometimes with a short, weaker median *av* which is about as long as *F3* height where situated. *T3* with an *av* beyond middle, and a shorter *ad*; clothing setulae in *ad* row slightly longer and more upright than usual; a longish preapical *d* to *pd* on apical 0.2; apical *av* and *pv* distinct. Hind metatarsus, expanded, very prominent (fig. 21, *c*), about as long as combined lengths of remaining segments and with a clump of long, fine, slightly curly *v* hairs at base. Fore and mid tarsi not unusually modified. Each hind coxa with a strong seta on dorsal apical margin.

Wings hyaline; third and fourth veins subparallel apically; posterior cross vein straight, perpendicular. Fifth traceable to wing margin. Halteres with black knobs, base fulvous to fulvous brown. Calyptrae white.

Abdomen subcylindrical; black; gray pruinescent. Dorsum of first visible tergite dark and with only a small median apical gray pruinescent dot; tergites 2 and 3 with a pair of brownish fuscous triangles, their lateral angles extending onto apical declivities; 4 gray above, sides brownish basally; with a row of strong apical bristles, a strong basolateral, and a few short ones between; tergite 5 obscured. Basal hypopygial segment with a pair of strong median dorsal bristles and numerous shorter setae. Basal sternite hairy; 2 and 3 with longish hairs and setae; 5 entire; with a broad V-shaped median incision (fig. 22, *c*). Hypopygium as in figures 23, *d*; 24, *a*.

DISTRIBUTION: Samoa, Caroline Is.

PALAU. KOROR: Male, May 1957, on dead giant African snail, Sabrosky. NGAIANGL: Five males, May 1957, some on beach, Sabrosky.

These specimens agree in most respects with Malloch's description except the *st* are not 1:1 as he describes. Mr. H. Oldroyd of the British Museum (Natural History) kindly examined the type of *albifacies* and informed me that he could see the pore of a third *st* bristle on each sternopleuron; he also confirmed the presence of an *ad* bristle on *T2* and a setula on each hind coxa on inner apical margins, characters which were not included in the original description. *Lispe cana* Walker, as determined by Malloch, in the U. S. National Museum, has a similar male hind metatarsus, but lacks vibrissae and hind coxal setae.

Genus **Fannia** Robineau-Desvoidy

Fannia Robineau-Desvoidy, 1830, Acad. Roy. Sci. Inst. France, Mem. **2**: 567. —Malloch, 1913, U. S. Nat. Mus., Proc. **44**: 621.—Seago, 1954, Am. Mus. Novitates **1699**: 1.—Hennig, 1955, IN Lindner, Flieg. Palaearkt. Reg., Lief. 182, Muscidae **63**, b: 18.

Homalomyia Bouché, 1834, Nat. Ins., 89.

Myantha Rondani, 1856, Dipt. Ital., Prodr. **1**: 95.
Dasyphyma Bigot, 1885, Soc. Ent. France, Ann. VI, **5**: 268.

Type species: *F. saltatrix* Robineau-Desvoidy (= *scalaris* Fabricius).

Front: narrow in male; broad in female. Female parafrontals bear a pair of long, outwardly directed bristles slightly behind middle. Arista bare. In profile, eyes very large; cheeks narrow; parafacials, parafrontals, and their juncture almost obscured. *Dc* 2:3; *pra* short or absent; prosternum, propleura, hypopleura, and pteropleura bare. Seventh wing vein strongly curved forward so that it would bisect the sixth if the latter were extended. Calyptrae moderately large, apically rounded; upper and lower ones subequal.

Key to Micronesian Species of Fannia

1. Males 2
   Females 4
2(1). Abdomen with a dark median vitta only; hind coxae with one or two bristles on inner dorsal margin .... **47. prisca**
   Abdomen with a series of three spots on dorsum of at least tergites 2 and 3; hind coxae bare on inner dorsal margin 3
3(2). *T3* with eight or more long *p* to *v* hairlike bristles .... **48. pusio**
   T3 without long *p* to *v* hairlike bristles .... **49. leucosticta**
4(1). Abdomen with three dark spots on tergites 2 and 3 .... **49. leucosticta**
   Abdomen unspotted 5
5(4). Abdomen shiny black; hind coxae bare on inner dorsal margin .... **48. pusio**
   Abdomen grayish pruinescent; hind coxae with one or two bristles on inner dorsal margin .... **47. prisca**

47. Fannia prisca Stein (figs. 3, *d*; 5, *d-f*).

Fannia prisca Stein, 1918, Mus. Nat. Hungarici, Ann. **16**: 154.—Malloch, 1935, Ann. Mag. Nat. Hist. X, **16**: 219.—Hennig, 1955, IN Lindner, Flieg. Palaearkt. Reg., Lief 182, Muscidae **63**, b: 23.

Male: 4.0-5.5 mm. long. Head fuscous, brownish gray pruinescent; parafacials and parafrontals somewhat more grayish than remainder of head. Front at narrowest part slightly wider than distance across posterior ocelli inclusive, and slightly narrower than width of antennal segment 3; at this point parafrontals are either contiguous or separated by a median vitta which is narrower than one parafrontal. With a nearly complete row of 9 to 14 longish, inwardly directed parafrontal bristles and a pair of longer reclinate posterior ones situated slightly anterior to anterior ocellus and longer than, or subequal to, anterior ocellar bristles. Antennae and palpi dark, normal.

Thorax black, brownish gray pruinescent; with three brownish vittae, median one narrowest but none are sharply defined or strongly contrasting. Basal portion of scutellum slightly more brownish than apical part. *Presut ac* setulae short, in two rows, one pair in series usually longer than others and with a short irregular row of hairs between them; *pra* short but distinct, weakly duplicated. Propleura entirely bare.

Legs fuscous, knees usually shiny brown. *F1* normal. *T1* without median bristles. *F2* with a complete row of closely placed *av* and *pv* bristles which are subequal to diameter of *F2* where situated; *a* and *p* surfaces with a complete row of numerous, closely placed setae; those on apical 0.20-0.25 conspicuously longer than others and those in *a* row shorter than *p*; latter somewhat hairlike. *T2* with a short *ad* and *pd* seta on apical 0.25 to 0.33, *av* and *pv* surfaces with many, uniform, upright, short hairs which are about twice as long as decumbent clothing hairs on other surfaces, or about 0.2 to 0.4 as long as

narrowest tibial diameter. *F3* of normal shape; with an almost complete row of *av* bristles which become longer apically and only those on apical 0.3 to 0.4 longer than *F3* diameter; *pv* surface with an almost complete row of slender hairlike bristles, and most of them, especially those near middle, are as long as, or longer than, greatest *F3* diameter. *T3* with a median, mid-dorsal bristle and another preapical *d*; a longish median to submedian *ad* bristle, a few short setulae basad, and a few more which are longer apicad; two median *av*. Each hind coxa with two longish hairs on inner dorsal surface.

Wings hyaline (fig. 3, *d*). Calyptrae pale, lower one distinctly protruding posteriorly beyond upper one, margins concolorous or slightly yellowish white. Halteres yellow. Hypopygium as in figure 5, *d-f*.

Abdomen slightly tapering apically, fuscous; grayish pruinescence has a slightly greenish brown to green tinge; with a narrow median dark vitta which is narrowly interrupted apically on each tergite. Nowhere with yellow or fulvous ground color.

Female: 3.2-5.0 mm. long. Similar to male. Front at vertex about 0.3 of head width, slightly widened towards base of antennae. Frontal vitta velvety black, at narrowest part about as broad as greatest submedian width of parafrontals, latter with a long strong median outwardly directed bristle and a reclinate posterior one, as well as a few shorter convergent ones on anterior and posterior portions. Parafrontals with a row of very short hairs laterad to bristles, and descending onto parafacials to opposite middle of antennal segment 3.

F2 without *av* and *pv* rows and setae in *a* and *p* series shorter and less numerous. *T2* frequently with a second *ad* seta before apical one; clothing setae on *v* surfaces not clearly differentiated from those on *d* surfaces. *F3* without distinct *pv* setae.

Abdomen more oval, entirely dark; pruinescence less dense and with median vitta less well defined.

DISTRIBUTION: Taiwan, Malaya, Bonin Is.

BONIN IS. CHICHI JIMA: Omura, two males, three females, Apr. 1958, male, female, May, June 1958; Okumura, "Yankee Town," 13 males, Apr. 1958. HAHA JIMA: N. Bay, female, Apr. 1958; Okimura, three females, Apr. 1958; 39 males, 37 females, Apr.-May, 1958. All by Snyder.

48. Fannia pusio (Wiedemann). (Figure *27, a.*)

Anthomyia pusio Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 437.

Homalomyia femorata Loew, 1870, Wiener Ent. Monatschr. **5**: 43.

Limnophora exilis Williston, 1896, Ent. Soc. London, Trans. **3**: 369.

Fannia pusio, Malloch, 1913, U. S. Nat. Mus., Proc. **44**: 623.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 109.—Seago, 1954, Am. Mus. Novitates **1699**: 8.

Small black species with sparse grayish thoracic pruinescence. Abdomen of male tripunctate; of female, subshiny. *F3* of male with a distinct preapical *v* tubercle which bears numerous long hairlike bristles; and *T3* with a series of numerous, long *p* to *v* hairs. Hind legs of female not tuberculate or long-haired.

DISTRIBUTION: Southern United States, Central and South America, Hawaii, Samoa, S. Mariana Is., Wake I., Ocean I.

S. MARIANA IS. Five. GUAM: Pt. Oca, June 1945, on dead rats, Bohart and Gressitt; Mt. Bolanos, Aug. 1952, Krauss; Mungmung, July 1945, Bohart and Gressitt.

WAKE I. One, Peale, July 1940, Lyons.

OCEAN I. One, Banaba, Dec. 1957, Krauss.

This species breeds in carrion, especially shell fish and old, rotting meat in late stages of decay. For detailed habits of this species on Guam, see Bohart and Gressitt (1951, p. 109). Seago (op. cit.) has shown that *trimaculata* Stein and *femoralis* Stein are distinct species and not synonyms of *pusio* as listed by Bohart and Gressitt (1951).

49. Fannia leucosticta (Meigen).

Anthomyia leucosticta Meigen, 1826, Syst. Beschreib. **7**: 328.

Homalomyia brevis Rondani, 1866, Atti. Soc. Ital., Milano **9**: 132.

Stroblia braueri Pokorny, 1893, Zool.-Bot. Ges. Wien, Verhandl. **43**: 542.

Fannia leucosticta, van Emden, 1941, Bull. Ent. Research **32**: 275; 1948, Exped. S.W. Arabia, British Mus. (N. H.) **1**: 168.—Seago, 1954, Am. Mus. Novitates **1699**: 7.—Hennig, 1955, IN Lindner, Flieg. Palaearkt. Reg., Lief 182, Muscidae **63**, b: 21, 24.

Head and thorax black, grayish pruinescent. Abdomen of both sexes with dense silvery pruinescence and with three dark dorsal spots on tergites 2 and 3 and a single median one on 4; basal tergite black, but with a narrow apical gray to silvery band. *F3* in male without a distinct preapical *v* tubercle, but with three or four *av* bristles on apical 0.25 and some much shorter ones basad. Hind legs in female not unusually bristled.

DISTRIBUTION: North America, south and central Europe, north Africa, Iran, Yemen, Solomon Is., Caroline Is.

PALAU. KOROR: Six, Feb., Apr., July 1953, 1957, at light and on decaying giant African snail, Beardsley and Sabrosky.

In the United States, this species is taken in carrion-baited fly traps, together with *pusio,* but is usually less common than the latter. Under identical laboratory conditions (90°, ± 0.5° F., RH 35-40 percent), *leucosticta* requires 12 days to go from egg to adult, *pusio* only 10.

Malloch (1914, Mus. Nat. Hungarici, Ann. **12**: 153) described *F. interrupta* from Formosa which belongs to the *pusio* group. The calyptrae of *leucosticta* males, despite Malloch's statement (op. cit., p. 154), vary from brownish hyaline with dark margins to almost smoky brown, and the lower one is larger than the upper. It seems probable that *interrupta* is very close to, if not identical with, *leucosticta,* especially since the *F3* bristling on the two is identical, but until the type of *interrupta* can be studied, I hesitate to place it in synonymy.

Genus **Ophyra** Robineau-Desvoidy

Ophyra Robineau-Desvoidy, 1830, Acad. Roy. Sci. Inst. France, Mem. **2**: 516. —Sabrosky, 1949, Hawaiian Ent. Soc., Proc. **13**: 423.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 113.

Type species: *O. leucostoma* Wiedemann.

Subshiny, blue-black flies with a conspicuous silvery-gray pruinescent frontal lunule, especially prominent in female. Front narrow in male, broad in female. Para-

frontals shiny. Female with ocellar triangle shiny, enlarged, and with a pair of cruciate interfrontal bristles; one of median parafrontal setulae proclinate and often stronger than adjacent posterior ones. *T3* in both sexes with a distinct *pd* bristle at or beyond middle. Third and fourth wing veins slightly to distinctly convergent apically. All veins, except costa, bare. Knobs of halteres brown to black, and usually darker than stalk.

Adult females are often found on fresh feces and well-rotted, but not dried-out, carrion; males are often on tree trunks, and frequently hover along paths or above areas where females are abundant.

Key to Micronesian Species of Ophyra

1. Palpi yellow to fulvous .... **50. aenescens**
   Palpi entirely fuscous 2
2. Posterior margin of eyes opposite antennal segment 2 distinctly emarginate. Male: apices of fore tarsal segments concolorous with remainder of tarsi and with one to three short, stubby spines at base of ventral surface of *F2*. Female: at level of cruciate frontal bristles, shiny black frontal triangle is at least three times as wide as a parafrontal at this same level .... **51. nigra**
   Posterior margin of eyes not emarginate. Male: apices of fore tarsal segments yellowish white to pale brown; with only fine hairs at base of ventral surface of *F2*. Female: frontal triangle at level of cruciate bristles twice as wide as a parafrontal at this same level .... **52. chalcogaster**

50. Ophyra aenescens (Wiedemann).

Anthomyia aenescens Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 435.
Anthomyia setia Walker, 1849, List. Dipt. Ins. British Mus. **4**: 956.
Ophyra trochanterata Malloch, 1932, B. P. Bishop Mus., Bull. **98**: 196.
Ophyra aenescens, Sabrosky, 1949, Hawaiian Ent. Soc., Proc. **13**: 427.

Palpi, antennal segment 2, and often base of 3 reddish fulvous to fulvous. Slight emargination of eyes shallow but more extensive dorsoventrally than in *nigra*. Frontal triangle in female extends to base of antennae. In males, parafrontals at narrowest part of front separated by 0.5 or more diameter of anterior ocellus. Fore tarsi entirely black. In males, *F2* with a series of three to five pairs of short, stout spicules on basal 0.25 to 0.33; in females, with or without one or two long, slender basal setulose hairs. In male, *F3* with or without one or two very short *v* spines and a short basal hair; in females, with only usual clothing hairs.

DISTRIBUTION: Southern United States to Argentina, Galapagos Is., southern Europe, Hawaii, Marquesas Is., Tahiti, Nauru I., Ocean I.

This species is included on the basis of specimens I have examined from Ocean I. and Nauru I. in the U. S. National Museum previously reported by Sabrosky (1949). Adults are commonly encountered on carrion and occasionally on fresh human feces out of doors. The species is easily reared in the laboratory.

51. Ophyra nigra (Wiedemann). (Figure 25, *i, j*.)

Anthomyia nigra Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 432.

Ophyra nigra, Stein, 1910, Mus. Nat. Hungarici, Ann. **8**: 555.—Malloch, 1923, Ann. Mag. Nat. Hist. IX, **11**: 665, 666.—Sabrosky, 1949, Hawaiian Ent. Soc., Proc. **13**: 428.

Antennae, palpi, and fore tarsi in both sexes black to fuscous, concolorous with remainder of fly. Posterior margin of eye in both sexes distinctly emarginate (fig. 25, *i, j*). Parafrontals of males broadly contiguous, and front at narrowest part usually narrower than diameter of anterior ocellus. Frontal triangle in female relatively broad, not extending anteriorly more than 0.5 to 0.6 distance to base of antennae. *F2* of male with one very short but distinct basal *v* spicule, and occasionally with one or two longer and more upright clothing hairs. *F3:* males with a short basal spicule; females with or without as slender basal *v* hairs. *T3:* males with a partial row of *av* bristles on apical 0.3 to 0.5; females with two *av* setae.

DISTRIBUTION: China, Russia, Japan, Okinawa, Buru, Samoa, Bismark Arch., Solomon Is., New Hebrides, Australia, S. Mariana Is., Caroline Is.

S. MARIANA IS. GUAM: One, Pt. Oca, May 1945, Bohart and Gressitt; one, Mt. Lamlam, Oct. 1952, Krauss.

PALAU. Five. BABELTHUAP: Ngerehelong, May 1957, Sabrosky. KOROR: Southwest part, 25 m., Dec. 1952, light trap, Gressitt; Apr. 1957, Sabrosky.

YAP. YAP: One, Oct. 1952, Krauss.

TRUK. WENA (Moen): One, Civ. Ad. Area, Feb. 1949, Potts.

PONAPE. Colonia, one, July 1949, Owen.

52. **Ophyra chalcogaster** (Wiedemann). (Figures 25, *h*; 27, *b, g.*)

Anthomyia chalcogaster Wiedemann, 1824, Analecta Ent., 62; 1830, Aussereur. Zweifl. Ins. **2**: 427.

Ophyra chalcogaster, Sabrosky, 1949, Hawaiian Ent. Soc., Proc. **13**: 431. —Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 113.

Male front at narrowest part not wider than diameter of anterior ocellus (fig. 27, *g*); female frontal triangle relatively narrow, extending about 0.75 distance to base of antennae (fig. 27, *b*). Posterior margin of eye not emarginate in either sex (fig. 25, *h*). Fore tarsi in male with ventral apical margin broadly white to yellow; dorsally, light color more limited. In female, fore tarsi entirely dark or with a very limited lighter apical dorsal region. Base of *F2* in male without distinct spicules, but with a row of about four or more short hairs, or spinulose hairs. *T3* of male with numerous long *av* setulae and bristles on apical 0.3 to 0.5.

DISTRIBUTION: Oriental, Ethiopian, and Australian Regions, Micronesia: all parts except Gilbert Is.

BONIN IS. 108. CHICHI JIMA: July 1951, Bohart; Omura, Okumura, Yoake Yama, Ogiura, Miyanohama, Sakai-ura, Apr., May, June 1958, Snyder. ANI JIMA: Commanders Beach, Southwest Bay, Apr., May 1958, Snyder. OTOTO JIMA: Kammuri-iwa, Hirone, Apr., June 1958, Snyder. HAHA JIMA: July 1951, Bohart; Okimura, Apr., May 1958, Snyder.

VOLCANO IS. Iwo JIMA: One, Sept. 1945, Dybas.

N. MARIANA IS. AGRIHAN: Two, July 1951, Bohart.

S. MARIANA IS. 19. SAIPAN: Mt. Tagpochau, 1 mile NNE of summit, Nov. 1944, Edgar; As Mahetog Area, Nov. 1944, Edgar. AGIGUAN: June

1952, Kondo. GUAM: 1911, Fullaway; Pt. Oca, Tumon Beach, Nov. 1952, Gressitt; Pt. Oca, May 1945, on dead mollusk, Bohart and Gressitt; Mt. Alifan, Apr. 1946, Aug. 1952, Krauss; Agana, May, Oct. 1945, Bohart, Gressitt, and Krauss.

PALAU. 25. BABELTHUAP: Melekeiok, May 1957; Ngaremediu, May 1957; Ngardmau, May 1957; Airai, Ngerimal R., May 1957; all by Sabrosky. KOROR: Apr., May, July, Sept. 1951, 1952, 1956, 1957, McDaniel, Gressitt, Sabrosky; S. W. Koror, Dec. 1952, Gressitt. NGERKABESANG: Apr. 1957, Sabrosky.

YAP. Nine. YAP: Kolonia, July, Aug. 1950, Goss; Ruul Distr., July, Aug. 1950, Goss; hill behind Yaptown, 60 m., light trap, Nov. 1952, Gressitt. MAP: Southern part, July, Aug. 1950, Goss.

CAROLINE ATOLLS. WOLEAI: One, Utigal I., Sept. 1952, Krauss.

TRUK. WENA (Moen): One, Civ. Ad. Area, Apr. 1949, Potts.

PONAPE. Colonia, two, Jan. 1938, July 1949, Kuya, Owen.

KUSAIE. Four. Mt. Fenkol, 300 m., Jan. 1953, Gressitt; Mutunlik, 22 m., Feb. 1953, Clarke.

MARSHALL IS. KILI: One, Oct. 1953, Beardsley.

Genus **Gymnodia** Robineau-Desvoidy

Gymnodia Robineau-Desvoidy, 1863, Hist. Nat. Dipt. **2**: 635.—Malloch, 1928, Ent. Mitteil. **17**: 296; 1929, Federated Malay States Mus., Jour. **14**: 457. —van Emden, 1951, Ruwenzori Exped. **2** (6) Muscidae C: 468.—Hennig, 1959, IN Lindner, Flieg. Palaearkt. Reg., Lief. 204, Muscidae **63**, b: 245.

Brontaea Kowarz, 1873, Zool.-bot. Ges. Wien., Verhandl. **23**: 461.

Eulimnophora Malloch, 1920, Am. Ent. Soc., Trans. **46**: 145.

Limnophora (*Gymnodia*) Collin, 1921, Ent. Mo. Mag. III, **7**: 96, 99.—Huckett, 1923, New York Ent. Soc., Jour. **40**: 52.—Hennig, 1952, Beitr. zur Ent. **2**: 73.

Type species: *G. pratensis* Robineau-Desvoidy (= ?*polystigma* Meigen).

Front narrow in male, broad in female. Eyes and arista bare. In profile, eyes large, parafacials and cheeks narrow (fig. 4, *d, e*). Prosternum, hypopleura and pteropleura bare; *pra* absent. All wing veins except costa bare; seventh not curved forward. Basal abdominal sternite with a fringe of setae on sides (fig. 2, *e*). Fourth wing vein slightly curved forward, except in *G. tonitrui* Wiedemann.

KEY TO MICRONESIAN SPECIES OF GYMNODIA

1. Thorax silvery pruinescent except for a transverse black band between transverse suture and level of second *postsut dc* bristle; and another across basal 0.66 or less of scutellum and an anterior *presut* spot between *presut ia* bristles .... **53. tonitrui**

   Thorax not so marked 2

2. Males 3
   Females 4
3. Lateral angles of triangular spots on visible abdominal tergites 2 and 3 extend over sides and onto ventral area; two to four pairs of short *presut ac* setulae in two regular series and without accessory median setulae. *F3* without a preapical *d* to *pd* bristle.. **55. expansa**
   Lateral angles of triangular spots on visible abdominal tergites 2 and 3 not extending onto declivitous portions; *presut ac* setulae in three to five irregular rows. *F3* with a preapical *d* to *pd* bristle.. **54. marguerita**
4. Thoracic dorsum without clearly defined brown vittae; *presut ac* setulae in two regular series of two to four pairs. *F3* without a preapical *d* to *pd* bristle .... **55. expansa**
   Thoracic dorsum gray with three brownish vittae, the median one in *ac* plane sometimes weak but each in *dc* plane distinct; *presut ac* setulae in four or more irregular rows. *F3* with a preapical *d* to *pd* bristle.. **54. marguerita**

53. **Gymnodia tonitrui** (Wiedemann). (Figure 2, *e*.)

Anthomyia tonitrui Wiedemann, 1824, Analecta Ent., 52; 1830, Aussereur. Zweifl. Ins. **2**: 429.

Limnophora tonitrui, Stein, 1913, Mus. Nat. Hungarici, Ann. **11**: 520.

Gymnodia tonitrui, van Emden, 1951, Ruwenzori Exped. **2** (6), Muscidae C: 474.

Head black, grayish pruinescent. Parafrontals broadly contiguous in male; widely separated in female by a velvety black vitta which becomes gradually narrower as it approaches base of antennae; at this level (frontal view) as broad as width of one parafrontal. Parafrontals: three or four short anterior bristles in males; a complete row in females. Frontal triangle absent in male, very short in female. In profile, parafacials, parafrontals, their juncture and cheeks narrow in male; their juncture more prominent in female. Antennae fuscous; palpi black.

Thorax: black, densely gray pruinescent; a small median, dark *presut* spot, its posterior margin with a deep inverted V-shaped incision at midline; a complete, broad, black, transverse *postsut* band, its posterior margin regular and extending to third *postsut dc* bristle. Scutellum: a basal transverse black band which extends about 0.5 distance to apex; in certain angles, this band appears to be covered with seal-brown pruinescence. Transverse distance between the three to five pairs of short, *presut ac* setulae conspicuously less than distance to adjacent *dc* bristles. Occasionally with an adventitious hair laterad to *ac* setulae. *Dc* 2 : 4, anterior two *presut* pairs slightly shorter than posterior two pairs. *St* 1 : 1, but one or two setae adjacent to base of posterior bristle, especially in male, longer than adjacent clothing hairs.

Legs mostly fuscous, tibiae and knees, especially in male, often fulvous brown. *T1* without median bristles. *F2:* a strong preapical *p,* and several shorter but distinct setulae basad, which, near middle of *p* surface, blend into clothing setulae. *T2* with one median *p*. *F3* with *av* series becoming longer and stronger from middle to near apex. *T3* with a short submedian *ad* and *av* seta.

Wings hyaline; fourth vein slightly curved forward apically. Calyptrae white; halteres yellow.

Abdomen of male mostly testaceous; silvery pruinescent. First visible segment mostly subshiny dark to brown; segment 2 with a transverse subshiny brown to black band which, at middle of tergum, extends posteriorly as an inverted U- to V-shaped connection and extends basally almost to base of tergite; 3 with median dark basal spot and a pair of narrow, dark, transverse, apical bands; 4 with a pair of small dark spots. Abdomen of female mostly fulvous, gray pruinescent; with two narrow transverse dark spots on segment 1, and a basal median, inverted U- to V-shaped spot on

2 to 4; 2 and 3 also with a pair of transverse apical bands; 4 with a pair of almost round spots.

DISTRIBUTION: Africa, Asia, India, S. Mariana Is.?

S. MARIANA IS. GUAM: Female, Mar. 1937, "from Boeing Clipper, Guam No. 1869, lot no. 39-9011," Oakley (US).

The data on the single specimen indicate that it might have been intercepted at Guam on a Pan-American Airways plane during early transpacific flights. The absence of this species in collections after 1937 suggests that it has not become established in Micronesia.

Hennig (1959, IN Lindner, Flieg. Palaearkt. Reg., Lief. 204, Muscidae 63, b: 247, 252, 253) has divided this species into two subspecies and lists several synonyms of each. Until more Micronesian material is available, it is impossible to place the above specimen in either subspecies.

In west Africa adults are abundant on feces and on adjacent low vegetation in swampy or marshy environments.

Anthomyia illocata Walker, though quite distantly related, can be easily confused when specimens are covered with lepidopterous scales, or poorly preserved, and the silvery pruinescence with dark thoracic and abdominal marks are the only characters used for identification.

54. **Gymnodia marguerita** Snyder, new species (figs. 4, *d*; 22, *g*).

Male: 3.4-4.2 mm. long. Head black, grayish pruinescent except for opaque dark area below postocular row of setulae. Parafrontals contiguous, frons at narrowest part less than diameter of anterior ocellus. In profile (fig. 4, *d*), posterior margin of eyes not quite as emarginate or as protuberant at juncture of parafacials and parafrontals as in *expansa* (fig. 4, *e*). Arista bare. Palpi black.

Thorax black; dorsum velvety except for seal-brown reflections on humeri, notopleura, a narrow irregular prescutellar band, and along apical margin of scutellum. *Dc* 2:4, anterior two *postsut* pairs slightly shorter than posterior pairs; *presut ac* setulae in three to five irregular series; prescutellar *ac* pair short; *ia* 3, anterior two pairs very short. Declivities of scutellum bare; two notopleurals, without accessory hairs; mesopleura with a conspicuous area devoid of bristles between dorsal and median ones in posterior row. Prosternum and hypopleura bare.

Legs fuscous to black. *F1* normal. *T1* without median bristles; only apical *d* clearly differentiated. *F2* with two to four short but distinct *v* spinules on basal 0.33; and two apical *p*, basad with a row of short, fine *p* hairs which are only slightly longer than *a* clothing hairs. *T2* with one median *p*. *F3* with one to three short preapical *av*, and a distinct preapical *d* to *pd*; the usual row of *ad* present. *T3* with one short median *ad* and two to five longer *av* on apical 0.5. Fore tarsal segments 1 to 3 with a longish apical *a* and *p* hair.

Wings brownish hyaline, slightly opaque at base; fourth vein gradually curved forward at apex. All veins except costa bare. Calyptrae yellowish brown, subhyaline; halteres yellow.

Abdomen short, broad, and subtruncate; fuscous; silvery to yellowish gray pruinescent. First visible tergite velvety black; 2 with a large pair of subtriangular black spots, their lateral margins not reaching to edge of the dorsum; 3 with a pair of smaller and more round to subtriangular spots apically; 4 unmarked; sternite 5 as in figure 22, *g*.

Female: 3.3 to 4.2 mm. long. Similar to male. Frontal vitta velvety black when viewed from behind; sparsely gray pruinescent when viewed from in front; at vertex, frons 0.30 of head width, slightly broader anteriorly.

Thorax gray with three indistinct longitudinal brown vittae in plane of *ac* and *dc* bristles.

T3 with one submedian *av*. Wings hyaline. Calyptrae white, margins sometimes slightly yellowish.

Holotype, male (US 67183), allotype, female (US), paratypes: 15 males, 10 females, Bonin Islands, Chichi Jima, Sakai-ura, "Bull Beach," Apr. 5-25, 1958, Snyder; 24 males, five females, topotypical, May 12-31, 1958; six males, 62 females, Okumura, "Yankee Town," Apr. 8-15, 1958; four males, Omura, "Camp Beach," May 5-June 9, 1958; 13 males, female, Yoake Yama, Apr. 21, 1958; two males, Chihiro-iwa, "Mulberry Beach," Apr. 11-22, 1958; male, Tatsumi Wan, Southeast Bay, Apr. 11-22, 1958; two females, Yatsuse R. (Minato-Ko), "Gen's. Beach," Apr. 10-22, 1958, all Snyder. Ototo Jima, male, female, Kammuri-iwa, Southwest Bay, June 3, 1958; female, Hirone, Northwest Bay, Apr. 9, 1958, all Snyder.

DISTRIBUTION: Bonin Is. (Chichi Jima, Ototo Jima).

See notes under *G. expansa.*

Dedicated to Marguerite Jenks Snyder in appreciation of her constant sympathetic help, understanding criticisms, and laborious typing of manuscripts.

55. Gymnodia expansa Snyder, new species.

Male: 3.6-4.5 mm. long. Similar to *marguerita*; profile as in figure 4, *e*. Dorsal portion of parafacials opposite antennal segment 2 shiny black, devoid of pruinescence.

Presut ac in two rows of three to four pairs of strongish setae; accessory hairs adjacent to propleural and stigmatal bristle longer and more numerous than in *marguerita.*

F2 usually with two *v* spines on basal 0.20 to 0.25. *F3* without a preapical *d* to *pd* bristle. *T3* with a single median *av* bristle.

Margins of upper calyptrae narrowly darkened.

Abdomen with marks on tergite 2 very large, almost trapezoidal, and lateral angles are continued onto declivitous portion of tergite so that gray pruinescence is confined to a narrow median vitta and basolateral portions; paired triangles on tergite 3 smaller but lateral angles are usually traceable to edge of dorsum; 4 with a pair of median longitudinal brown streaks. Dense gray to silvery pruinescence in spots obscures ground color of tergites 2 and 3, but when these are viewed from front and side they are fulvous as is a limited ventral apical portion of tergite 1. Sternite 5 as in figure 22, *h*.

Female: 3.6-4.6 mm. long. Similar to male, and to female of *marguerita*. Parafacials not bare and shiny black above. Front as in females of *marguerita*. Thoracic dorsum diffuse slate gray to seal brown, humeri, notopleurae and prescutellar region yellowish gray; latter area with anteriorly extending excisions mesad to *dc* planes.

Wings hyaline; calyptrae white.

Abdominal ground color fuscous and black subtriangular marks on tergite 3 sometimes do not quite extend to lateral declivities.

Holotype, male (US 67184), allotype, female (US), two male paratypes: Bonin Is., Chichi Jima, Sakai-ura, "Bull Beach," Apr. 5-25, 1958, Snyder. Other paratypes: four topotypical males, May 12-31, 1958; 11 females, Okumura, "Yankee Town," Apr. 8-15, 1958; two females, Omura, "Camp Beach," Apr. 2-25, 1958; male, Yoake Yama, Apr. 21, 1958, all Snyder.

DISTRIBUTION: Bonin Is. (Chichi Jima).

These two new species differ from the Palaearctic *G. humilis* (Zett.) in having the fourth vein slightly, but nevertheless distinctly, curved forward,

and from the Lombok species *parascendens* Hennig [Beitr. Ent. **2** (1) : 73, 1952] in having the oral margin not distinctly projecting, and only one instead of two posterior bristles on *T2*. The Formosan and Sumatran species *ascendens* Stein (1915, Suppl. Ent. **4**: 32) has the fourth vein less curved forward than in either species. The several rows of shortish *presut ac* setulae and the two to four *av* bristles on *T3* will readily separate *marguerita* from both *expansa* and *ascendens* which have a double row of stronger *presut ac* setulae and a single median *av T3* bristle; the shiny upper margins and the fulvous ground color of second and third abdominal tergites also separates *marguerita* from *ascendens*.

Gymnodia marguerita and *G. expansa* will trace to *nigrogrisea* Karl (1939, Arb. Morph. Tax. Ent., Berlin-Dahlem **6**: 279) and *spilogaster* Seguy (1932, Encyl. Ent. B. II, Dipt. **6**: 81) respectively in Hennig's key to Palaearctic species of Muscidae (1959, IN Lindner, Flieg. Palaearkt. Reg., Lief 204, pp. 247, 250, 252), which were described from East Asia and China. In his notes and redescriptions of *nigrogrisea,* it differs from *marguerita* in having pale wings and calyptrae, whereas those of *marguerita* are dark and in this respect similar to *humilis* Meigen which is easily separated by having the fourth wing vein subparallel to the third and not convergent as in *marguerita. Gymnodia expansa* has distinct median spots on fourth tergite (fifth of Hennig) while *spilogaster,* according to Hennig, has this tergite entirely darkened ("ganz schwarz").

Genus **Limnophora** Robineau-Desvoidy

Limnophora Robineau-Desvoidy, 1830, Acad. Roy. Sci. Inst. France, Mem. 2: 90.—van Emden, 1951, Ruwenzori Exped. 2 (6), Muscidae C: 379.—Hennig, 1959, IN Lindner, Flieg. Palaearkt. Reg., Lief. 207, Muscidae **63**, b: 367.

Calliophrys Kowarz, 1893, Wiener Ent. Zeitung **12**: 49.

Limnophora (*Limnophora*) Malloch, 1918, Ent. Soc., Trans. **44**: 274.—Collin, 1921, Ent. Mo. Mag., III, **7**: 96.—Malloch, 1928, Ent. Mitteil. **17**: 290. —Huckett, 1932, New York Ent. Soc., Jour. **40**: 35.

Limnophora (*Calliophrys*) Collin, 1921, Ent. Mo. Mag., III, **7**: 247.

Type species: *L. palustris* Robineau-Desvoidy.

Front narrow or broad in male; broad in female. Arista short- to long-haired. Oral margin, or juncture of parafacials with parafrontals, or both sometimes distinctly protuberant. Eyes bare. *Pra* absent. Prosternum with lateral hairs or setae (fig. 2, *b*). Propleura and pteropleura bare. Posterior thoracic spiracle without interspersed bristles in operculum. Node or third wing vein, or both, with several hairs on either dorsal or ventral, or both surfaces (fig. 3, *e*). Species predominately dark-colored.

Other characters, helpful but not present in all species, are slight forward curvature of fourth wing vein; bare hypopleura and basal abdominal sternite (fig. 2, *c*).

Species of this genus are often found on carrion or feces and on rocks along the margins or in the middle of fast flowing streams. In the Bonin Islands, they were especially abundant on rocks in the fine spray below waterfalls.

KEY TO MICRONESIAN SPECIES OF LIMNOPHORA

MALES

1. Narrowest distance between eyes not greater than distance across posterior ocelli inclusive .... **56. haha**
   Narrowest distance between eyes greater than distance across posterior ocelli, and in most species 0.25 or more of greatest head width 2

2(1). Longest hairs on arista distinctly longer than greatest aristal diameter 3
   Arista bare, or longest hairs conspicuously shorter than greatest aristal diameter 4

3(2). *F2* with one to four distinct *v* bristles on basal 0.5. In profile, preapical hairs on abdominal sternite 5 conspicuous. Large species .... **57. umbra**
   F2 without differentiated *v* bristles. In profile, preapical hairs on abdominal sternite 5 inconspicuous. Very small species .... **58. plumiseta**

4(2). Fore tarsal segments with a large portion of segments 3 and 4 yellow, sharply contrasting with remainder of fuscous legs. *T3* without median *av* bristles .... **59. bracteola**
   Fore tarsi entirely fuscous, concolorous with remainder of legs. *T3* with a median *av* bristle 5

5(4). Basal abdominal sternite with numerous marginal bristles 6
   Basal abdominal sternite bare or with only one or two hairs 7

6(5). Front slightly constricted near middle and not more than 0.5 width of one eye. *F3* with several *pv* bristles on apical 0.25 or more which are longer than *F3* diameter. Notopleura with a few hairs adjacent to the two bristles. Beret often with a few hairs; *dc* 2: 4 .... **60. setibunda**
   Front parallel-sided, at middle as wide as, or wider than width of one eye. *F3* without *pv* bristles, at most a short apical setula. Notopleura bare adjacent to the two bristles. Beret entirely bare; *dc* normally 2: 3 .... **61. boninensis**

7(5). Parafrontals with a strong divergent median bristle on each side (as in females of *Fannia,* fig. 27, *a*); *F2* with one preapical *p* and one *v* bristle on basal 0.50 to 0.33 .... **64. extincta**
   Parafrontals without a median divergent bristle; *F2* with two preapical *p*, and without basal *v* bristles .... **62. dybasi**

FEMALES

1. Longest hairs on arista longer than its greatest diameter 2
   Arista bare, or longest hairs shorter than greatest aristal diameter 4

2(1). Calyptrae smoky brown, especially their margins .... **56. haha**
   Calyptrae white to yellowish white, margins not brownish 3

3(2). Small species, usually not more than 3.5-4.0 mm. long. Triangular median abdominal spots opaque, fuscous brown .... **58. plumiseta**
   Larger species, usually 5.5-6.0 mm. long. Triangular median abdominal spots subshiny black .... **57. umbra**

4(1). Thoracic dorsum with a complete narrow median gray vitta and a less conspicuous one presuturally in each *dc* plane. Postocular setulae longish and in a single row, area below them bare or with only one or two inconspicuous hairs .... **63. carolina**

Thoracic dorsum without longitudinal gray vittae; either mostly dark or with transverse gray, prescutellar and presutural bands. Postocular hairs in several irregular rows 5

5(4). *F3* with a preapical *av*, and *T3* with a submedian *av* bristle .... **62. dybasi**

F3 and *T3* without the above combination of *av* bristles 6

6(5). *F3* with a preapical *av* bristle; *T3* without a submedian *av* bristle; *T1* with a median *p* bristle .... **59. bracteola**

F3 without a preapical *av* bristle; *T3* with a submedian *av* bristle; *T1* without a median *p* bristle 7

7(6). Beret and notopleura without accessory hairs or setulae. Parafacials silvery .... **61. boninensis**

Beret and notopleura with two or more accessory hairs or setulae. Parafacials slate gray .... **60. setibunda**

56. **Limnophora haha** Snyder, new species (fig. 25, *f*).

Male: 4.3-5.0 mm. long. Head: black, densely gray pruinescent; frontal vitta velvety black. Front at narrowest part equal to, or narrower than, distance across posterior ocelli inclusive. Parafrontals: row of convergent parafrontal bristles continued to almost opposite anterior ocellus, terminating with a pair of short, proclinate setae. Anterior ocellar bristles almost as strong as strongest (anterior) pair of parafrontal bristles. In profile (fig. 25, *f*), oral margin not strongly projecting; cheeks as high as width of antennal segment 3; and juncture of parafacials and parafrontals extend anteriorly 0.5 width of antennal segment 3. Antennae fuscous; inserted opposite middle of eyes, and extend to about opposite their lower margin; segment 3 twice as long as 2. Longest hairs on arista 1.25 to 2.00 times its greatest diameter, or those on both surfaces, including aristal diameter where situated, about 0.75 the width of antennal segment 3. Palpi black, slender and about as long as mentum. Eyes bare.

Thorax black with grayish pruinescence on humeri, notopleura, narrowly along transverse suture, and in front of scutellum; thus with a broad presutural black, uninterrupted spot, and a transverse postsutural black band which extends posteriorly to about insertion of last *postsut dc* bristle. *Presut ac* setulae, in five to seven irregular rows, and a pair of short, prescutellar *ac* bristles; *dc* 2 : 4, anterior two postsutural pairs conspicuously shorter than posterior two pairs; *ia* 1; *ntpl* bare adjacent base of both bristles. Scutellar setulae extend to but not below level of marginal bristles. *St* 1 : 2.

Legs fuscous, articulations of femora and tibiae subshiny brown. *F1* normal. *T1* without median bristles. *F2:* three to four *v* on basal 0.25 to 0.50; a submedian *a*, which is somewhat stronger than adjacent clothing setulae; and two preapical *p* to *pd* bristles. *T2* with two median *p* bristles. *F3:* usually with two or occasionally three *av* on apical 0.25 to 0.30; *pv* surface with clothing setulae longer and more upright than usual. *T3:* one median *ad* and *av* bristle, and an apical *d* and *pv*.

Wings subhyaline, slightly tinged with brown. Several short setulae on dorsal and ventral surfaces of node but not beyond. Third and fourth veins very slightly convergent apically. Calyptrae concolorous with wings, their margins darker; halteres yellow to fulvous.

Abdomen fuscous, with gray pruinescence on sides of tergites 2 and 3, and with diffuse brown pruinescence over remainder of dorsum. This largely obscures a pair of dark triangles on tergites 2 and 3, and a median one on 4; tergite 1 mostly dark. Basal sternite bare.

Female: 4.3-5.6 mm. long. Similar to male. Front at vertex 0.29 of head width, broadened to 0.35 at base of antennae. Anterior parafrontal bristles convergent; posterior two pairs backwardly and outwardly directed, and with numerous short hairs laterad to all bristles. Oral margin more conspicuously projecting than in male.

F2 with *v* bristles shorter and *a* stronger than in male. *F3* without upright *pv*. Hairs on third wing vein often continued slightly beyond node.

Abdomen with black triangles more expansive, gray pruinescence more reduced, and without overlaying brown color.

Holotype, male (US 67185), allotype, female (US), paratypes (BISHOP, US): three males, six females, Bonin Is., Haha Jima, Okimura, Apr. 26-June [error for May] 9, 1958; three females, topotypical, Apr. 6, 1958; three females, North Bay, Apr. 7, 1958, all Snyder; two males, Ogasawara, Haha Jima, 1931, Motoike and Ise.

DISTRIBUTION: Bonin Is. (Haha Jima).

This species will trace to *ascendens* Stein in his key to Formosan species (1915, Suppl. Ent. **15**: 38), but that species is a *Gymnodia*. In his key to Java species (1909, Tijdschr. Ent. **52**: 243) it traces to *tonsa* Stein which is a *Heliographa*, a genus not present in the Micronesian material before me. *L. haha* does not appear related to any Palaearctic species.

57. **Limnophora umbra** Snyder, new species (fig. 25, *e*).

Male: 3.8-5.4 mm. long. Head black, gray pruinescent; frontal vitta velvety black and overlaid with sparse gray pruinescence. Front at vertex 0.25 to 0.28 of greatest head width, gradually widened to 0.30 to 0.34 at base of antennae. Frontal vitta at middle about three times as wide as one parafrontal and at this level the latter about as wide as distance across posterior ocelli inclusive. With a complete row of parafrontal bristles, posterior two pairs backwardly and outwardly directed, others convergent and with a few short hairs laterad to them. Anterior ocellars, and inner verticals at least as long and as strong as other frontal bristles. Antennae large and prominent, fuscous, segment 2 sometimes brownish; inserted opposite dorsal third or less of eyes and extending to opposite their lower margins. Broad antennal segment 3 is 3.0 to 3.2 times as long as 2. Longest hairs on arista 1.5 to 2.2 times as long as its basal diameter. Profile as in figure 25, *e*. Palpi dark. Eyes bare.

Thorax black, gray pruinescent, and with a pair of large *presut* subquadrate black spots which occupy most of dorsum except for posterior part of humeri, entire notopleura, a narrow transverse area before suture, and a variable irregular median gray line; with a broad transverse, dark, *postsut* band, prescutellar area gray pruinescent. Scutellum blending from dark gray at apex to fuscous pruinescent at base. *Presut ac* setulae short, in several irregular rows and occupying most of area between 2: 4 *dc*, anterior two *postsut* pairs usually shorter than others; notopleura without adventitious hairs adjacent to bristles; scutellar setulae not descending into sides below level of marginals; *st* 1: 2; all parts of hypopleura bare. Prosternum with lateral hairs or setulae.

Legs fuscous, knees brownish. *F1* normal. *T1* with or without a median *p*; apical *d* and *pv* short but distinct. *F2* with several *v* on basal 0.25 to 0.50, a short *a* near middle, and two strong preapical *p*. *T2* usually with two median *p*. *F3* with one to four *av* on apical 0.25 or less; remainder of this and *pv* surface without distinct bristles. *T3* usually with one median *ad* and *av*.

Wings hyaline, faintly tinged. Node hairy on dorsal and ventral surfaces, other veins except costa bare; third and fourth slightly convergent. Posterior cross vein straight. Calyptrae white, hyaline, the margins narrowly pale yellow; halteres fulvous.

Abdomen fuscous, gray pruinescent; often a variable dorsal and lateral apical area of tergites 1 and 2 fulvous. Dorsum of tergite 1 mostly subshiny fuscous; 2 and 3 with a pair of large, triangular spots which extend laterally to about middle of pleura apically and may or may not be subconfluent medianly, thus dorsum with a basolateral gray pruinescent area and either a median gray line or a small basal median gray triangle. Dorsum of segment 4 mostly dark, subshiny, sides gray pruinescent.

Basal sternite bare; 5 with several long, slender setulae basad to cleft and processes which reach to opposite or beyond hypopygium in profile.

Female: 4.4-6.2 mm. long. Similar to male. Front somewhat broader, vertex 0.26 to 0.30 of head width, frons broadened to 0.35 to 0.40 at base of antennae. Juncture of parafacials and parafrontals not so strongly projecting and about as protuberant as oral margin. Antennae narrower and segment 3 usually 2.8 to 3.0 times as long as 2.

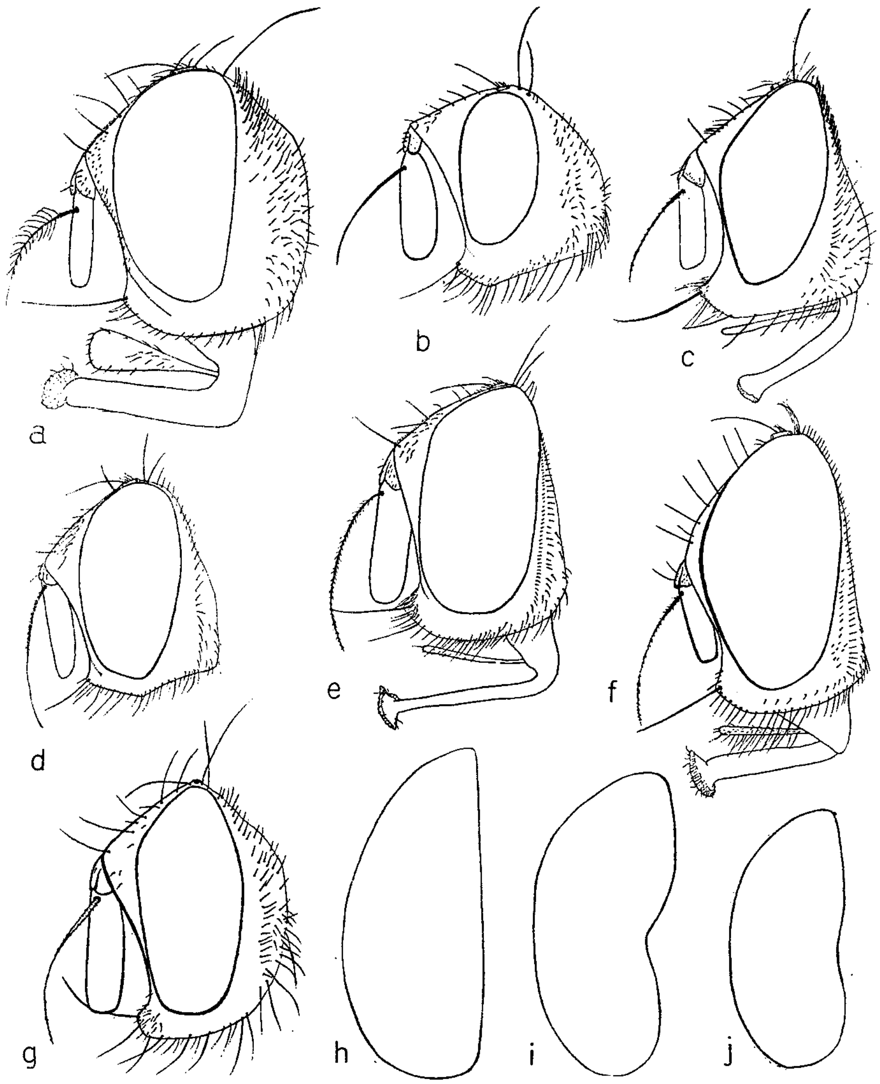


FIGURE 25.—**a-g,** Male head profiles: *a, Lispe incerta*; *b, Limnophora boninensis*; *c, L. setibunda*; *d, L. dybasi*; *e, L. umbra*; *f, L. haha*; *g, L. bracteola.* **h-j,** eye profiles: *h, Ophyra chalcogaster,* male; *i, O. nigra,* male; *j, O. nigra,* female.

The *v* bristles on *F2* absent or scarcely distinguishable. Margins of calyptrae slightly darker than male but not fuscous.

Abdomen with fulvous area usually much reduced or absent and the dorsal spots more shiny and less contrasting.

Holotype, male (US 67186), allotype, female (US), paratypes (BISHOP, US): seven males, 20 females, Bonin Is., Chichi Jima, Omura, "Camp Beach," May 5-June 9, 1958, Snyder; six males, 28 females, topotypical, Apr. 2-25, 1958; male, female, Okumura, "Yankee Town," Apr. 8-15, 1958; eight females, Miyanohama, "Jack Wm's Beach," Apr. 2-25, May 12-June 9, 1958; seven males, 15 females, Sakai-ura, "Bull Beach," Apr. 5-25, 1958; eight males, seven females, Sakai-ura, "Bull Beach," May 12-31, 1958; female, Chihiro-iwa, "Mulberry Beach," Apr. 11-22, 1958; male, Tatsumi Wan, S.E. Bay, Apr. 11-22, 1958; three males, 24 females, Yatsuse R. (Minato ko), "Gen's Beach," Apr. 10-22, 1958; six females, Yoake Yama, Apr. 21, 1958; two males, two females, Ogiura, Apr. 8, May 12, 1958, all Snyder; male, Futami-ko, May 10, 1956, Clagg; four females, Nishi Jima, May 22, 1958, Snyder and Mitchell; male, two females, Minami Jima, Long I., May 27, 1958; Ani Jima: two males, 30 females, Southwest Bay, May 17, 1958; four males, 13 females, Sen-zan (N.E. Bay), May 28, 1958; Ototo Jima: two males, seven females, Kammuri-iwa (S. W. Bay), June 3, 1958; three males, three females, Northwest Bay, Hirone, Apr. 9, 1958. Haha Jima: two males, 15 females, N. Bay, Apr. 7, 1958; 21 females, Apr. 6, 1958; 28 males, 101 females, Okimura, Apr. 26-June [error for May] 9, 1958. All Snyder.

Additional specimens (in very poor condition): male, Bonin Is., Apr. 22, 1931, Motoike and Ise; two males, female, Chichi Jima, July 10, 1951, Bohart; female, Haha Jima, July 18, 1951, Bohart.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima).

There is considerable variation in size, color, and leg bristles. Some males have the sides of first two tergites with conspicuous fulvous areas which may even cause the lateral angles of the dorsal triangles on second tergite to appear brownish, while in others it is so reduced as to be scarcely visible or very occasionally completely absent. The *p* bristle on *T1* is present on one leg and absent on the other in the type (not an uncommon occurrence) while other specimens either lack this bristle on both legs or have a very strong one on both. Most females are without any indications of fulvous on sides of abdomen and usually the *presut* dark spots are more reduced than in the male. For holotype and allotype I have selected, as near as possible, a mean of the maximum variations.

This species traces to *flavolateralis* Malloch in his key to Samoan species [1929, Insects of Samoa **6** (3): 165, 167], but differs from it in having several strong *v* bristles on *F2,* broad prominent antennae, expansive dark spot on the fourth abdominal tergite and in the *st* not being 1 : 1.

The species was commonly taken on the ground or on leaves along shady paths; the females, especially, were on crushed, dead giant African snails, though also frequently abundant on shady rocks in slowly flowing streams.

58. **Limnophora plumiseta** Stein (figs. 2, *b, c*; 3, *e*; 20, *h*).

Limnophora plumiseta Stein, 1903, Zool. Mus. Berlin, Mitt. **2**: 109; 1909, Tidjschr. Ent. **52**: 244; 1915, Suppl. Ent. **15**: 39.—Malloch, 1928, Ent. Mitteil. **17**: 295; 1929, Insects of Samoa **6** (3): 165.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 112.—Hennig, 1952, Beitr. zur Ent. **2**: 71.

Limnophora macrophthalma van Emden, 1951, Ruwenzori Exped. **2** (6), Muscidae C: 400.

Entire insect black in ground color; male head viewed from in front rather dull brownish gray pruinescent, frontal vitta more brownish and with a subshiny ocellar triangle which extends to base of antennae. Head 1.18 times as wide as high; front at vertex 0.439 of head width and 0.474 at base of antennae. With five to six pairs of parafrontal bristles; anterior one strongest, posterior one backwardly directed; with several short setulae adjacent to intermediate ones. Inner and outer verticals strong, subequal to anterior parafrontals and anterior ocellars. Head profile as in figure 20, *h*. Longest aristal hairs 1.25 times as long as greatest aristal diameter; those on both surfaces, including aristal diameter, about 0.33 of width of antennal segment 3. Palpi slender. Proboscis shiny black.

Thorax, viewed from above and behind, black except dense grayish pruinescence on humeri, *ntpl*, and a *presut* band which is narrowly interrupted medianly; and an irregular grayish prescutellar band extending from base of scutellum to almost opposite third posterior *postsut dc* bristle and slightly anterior to posterior *ia*. Scutellum and postalar callosities entirely black. *Presut ac* setulae in four or five irregular rows; *dc* 2:4, anterior two *postsut* pairs very much shorter than those behind them. Scutellar setulae do not descend below level of marginals. *St* 1:2, the lower posterior one about 0.5 as long as upper one, and 0.66 as long as anterior one.

T1 without median bristles; a single *d* at apex. *F2:* a strong median *a* and a few shorter setulae basad; a distinct preapical *p* and *pd* bristle, without distinct bristles on *v* surfaces. *T2* with two short median *p*. *F3:* one or two preapical *av* bristles; remainder of *av* and other *v* surfaces bare. *T3* with a short median *ad* and *av* bristle. Tarsi normal, the claws and pulvilli minute.

Wings hyaline, third and fourth veins very slightly convergent apically, but fourth can scarcely be considered to be curved forward as in most *Limnophora* s.str. Costal setulae very short, thorns not differentiated. Node with distinct setulae on ventral surface and usually with one or two on dorsal. Posterior cross vein perpendicular, situated opposite basal 0.40 of ultimate section of fourth vein. Calyptrae whitish brown; halteres yellow.

Abdomen: first visible tergite entirely black, tergites 2 and 3 with a pair of subtrapezoidal brownish to brownish black spots, their median margins parallel and separated by a gray pruinescent stripe, and their posterolateral angles reaching to lateral declivities of tergites; tergite 4 with a subtriangular median brown spot. Abdominal pruinescence grayish brown, with slight blue to greenish reflections. Tergal bristles weak, only apical row distinct, though one or two discals on each side are usually differentiated. Basal sternite bare.

Female: Similar to male, but aristal hairs slightly longer; the longest 1.75 times as long as greatest aristal diameter, and on both surfaces, including aristal diameter, about 0.5 as long as width of antennal segment 3. In frontal view, front narrower at apex than in male; at vertex, 0.361 of head width, widening to 0.452 at base of anten-

nae. Posterior cross vein perpendicular or slightly curved. Basal abdominal sternite larger and more distinct than in male, 2 more elongate, though rounded apically.

DISTRIBUTION: Egypt, western Africa, India, Taiwan, Sumatra, Sunda Is., Mariana Is., Caroline Is.

N. MARIANA IS. ANATAHAN: Five, Aug. 1951, Bohart.

S. MARIANA IS. 57. SAIPAN: Sept. 1944; "Off. Mess, Med. Bn., 2nd Mar. Div.," Aug. 1951, Bohart. GUAM: 1911, Fullaway; June 1948, on *Ochrosia* sp., Oakley; Pilgo R., May 1945; Potts Junction, Aug., Oct. 1952, Krauss; Piti, Sept. 1936, Swezey; Yigo, Aug., Oct. 1957, Krauss; Pt. Oca, June 1945, Bohart and Gressitt; Ritidian, Jan. 1946, human feces, Gressitt; Near Yona, July 1945, Bohart and Gressitt; Mt. Bolanos, Aug. 1952, Krauss; Mt. Lamlam, Oct. 1957, Krauss; Mt. Alifan, May 1936, Swezey; Machanao, Aug. 1936, on corn tassels, Swezey; Merizo, Oct. 1957, Krauss.

PALAU. 30. BABELTHUAP: Ngesebus, May 1957, Sabrosky; Ngerehelong, May 1957, Sabrosky; Melekeiok, May 1957, Sabrosky; Ngiwal, May 1957, Sabrosky; Ngaremlengui, June 1957, Sabrosky. KOROR: Mar., June, July, Sept., Dec. 1952, 1953, at light, Beardsley; Apr. 1957, Sabrosky. NGAIANGL: May 1957, Sabrosky.

YAP. 88. YAP: Aug., Oct. 1952, Krauss; Mar. 1954, Beardsley; July 1951, Gressitt; Ruul, July, Aug. 1950, Goss; Dugor, July, Aug. 1950, Goss; Kolonia, July, Aug. 1950, Goss; June 1957, Sabrosky; Weloy, June 1957, Sabrosky; central part, July, Aug. 1950, Goss; Mt. Matade, 60 m., Dec. 1952, Gressitt; Nif, Nov. 1939, Esaki; near Yaptown, July 1946, Townes. MAP: East and south part, July, Aug. 1950, Goss. GAGIL: July, Aug. 1950, Goss. RUMUNG: June 1957, Sabrosky; northeast and west parts, July, Aug. 1950, Goss.

CAROLINE ATOLLS. 15. NGULU: Ngulu I., Oct. 1952, Krauss. ULITHI: Fassarai I., July 1946, Townes. FAIS: Oct. 1952, Krauss. WOLEAI: Falalis I., Sept. 1952, Krauss; Utagal I., July 1946, Townes. IFALIK: Ifalik I., Sept. 1952, Krauss; Aug. 1953, Bates.

Bohart and Gressitt illustrate the egg and puparium of this species. Their observations indicate that the species is not abundant in dense shade and, while seen on human feces in these environs, oviposition was noted only on fallen breadfruit. They also record a frequent high mortality due to predation by *Atherigona orientalis* (= *excisa*) larvae. In West Africa, this species was very abundant on feces in jungle shade and in low bush adjacent to native villages.

59. Limnophora bracteola Snyder, new species (figs. 25, *g*; 27, *i*).

Male: 4.2-4.6 mm. long. Head black with bluish-gray pruinescence, sparse on frontal vitta. Viewed from side and below, dorsal 0.2 to 0.3 of occiput with dark reflections. Front at vertex 0.36 to 0.38 of head width, almost parallel-sided. With three pairs of convergent parafrontal bristles on anterior 0.6, a few weak hairs laterad to them and two backwardly and outwardly directed bristles behind; anterior one of latter two usually longest. In profile, head distinctly higher than long; juncture of parafacials and parafrontals as long as maximum width of rather broad antennal segment 3, and

equal to greatest height of cheek. Antennae black, apex of segment 2 slightly brownish; inserted opposite dorsal 0.33 of eyes, and extending to, or slightly below, their lower margin (fig. 25, *g*). Longest aristal hairs not longer than greatest diameter of arista. Eyes bare. Palpi black, long and slender.

Thorax black, dorsum subshiny except grayish pruinescent humeri, notopleurae, and an incomplete narrow incision along transverse suture; pleurae gray pruinescent. *Presut ac* in two irregular rows which are closer together than to adjacent 2:3-4 *dc*; *ntpl* 2, without setulae adjacent to bristles. Scutellum with about one to three longish hairs which descend very slightly onto declivities between apical and basal bristles; *st* 1:2, but only dorsal posterior ones strong. Prosternal hairs sparse.

Legs black; entire tarsal segment 4, apical 0.5 or more of 3 and a very limited basal streak on 5 yellow and in sharp contrast with remainder of legs. Tarsi slender, distinctly longer than tibiae (fig. 27, *i*). *F1* normal. *T1* with a median *p*; apical *d* and *pd* bristles subequal, slightly longer than *T1* diameter. *F2* without bristles except a weak median *a* and two preapical *p*. *T2* with two median *p*. *F3* with a complete row of *ad* and one distinct preapical *av* and *pd*. *T3* with one median *ad* only, but with usual apical *d* and *av* bristles.

Wings hyaline, slightly tinged. Node haired on both surfaces. Third and fourth veins very slightly convergent apically and posterior cross vein somewhat undulate. Calyptrae hyaline, margins, especially lower ones, narrowly fuscous; halteres brown to brownish yellow.

Abdomen subcylindrical; black, subshiny, basolateral angles of tergites 2 to 4 with limited, narrow, bluish-gray streaks. Basal sternite bare; 5 with a deep V-shaped incision, lateral processes without strong bristles.

Female: 4.4-5.3 mm. long. Similar to male, parafrontals narrowly brownish along plane of bristles; antennal segment 3 not so broad and ending slightly above lower level of eyes.

Thorax and legs as in males except fore tarsi are entirely black, and *F2* usually with one or two shorter setulae basad to median *a* bristle.

Abdomen more pointed and shiny. Basal sternite usually with a few short hairs.

Holotype, male (US 67187), allotype, female (US), paratypes (BISHOP, US), nine males and 35 females: Bonin Is. Haha Jima, Okimura, Apr. 26-June [error for May] 9, 1958, Snyder. Other paratypes: Chichi Jima, three males, three females, Yatsutse R. (Minato-ko) "Gen's. Beach," Apr. 10-22, 1958; Sakai-ura, "Bull Beach," female, Apr. 5-25, five females, May 12-31, 1958; male, four females, Tatsumi Wan, S.E. Bay, Apr. 11-22, 1958; two females, Yoake Yama, Apr. 21, 1958; Okumura, "Yankee Town," Apr. 8-15, 1958; Ani Jima, male, two females, Sen Zan (N.E. bay), May 28, 1958; three males, four females, S.W. Bay, May 17, 1958, all Snyder. Female, Ogasawara Haha, 1931, Motoike and Ise.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima).

The yellow color of the slender male fore tarsi will distinguish *bracteola* from any described species.

60. **Limnophora setibunda** Snyder, new species (fig. 25, *c*).

Male: 4.1-5.0 mm. long. Entire insect black with pruinescence color as indicated.

Head gray except for velvety brown to fuscous frontal vitta and a dark area on dorsal 0.2 to 0.3 of back of head. Front at narrowest point 0.15 to 0.18 of greatest head width, and at this point each parafrontal less than 0.5 minimum width of frontal vitta; latter about 1.5 to 2.0 times as wide as distance across posterior ocelli inclusive. A complete row of short irregular parafrontal bristles and a few lateral hairs adja-

cent to anterior two or three. In profile, head is as long as high (fig. 25, *c*). Longest hairs on the arista shorter than its basal diameter.

Thoracic dorsum subshiny brown to fuscous; gray pruinescence on humeri, along outer margins of notopleurae, and on pleurae except a variable dark area on mesopleurae. *Presut ac* setulae longish and slender, in two irregular, closely adjacent rows; *dc* 2:4, anterior two *postsut* pairs shorter than posterior two pairs, but subequal to two *presut* pairs; *ntpl* with a few scattered hairs which frequently descend to a level of *ntpl* bristles. Scutellum with numerous short hairs which descend onto declivities and frequently invade rim on ventral surface; beret with a few hairs; *st* 1:2, only posterodorsal one strong. Prosternum with many short, lateral hairs.

F1 normal. *T1* without a median *p*, only apical *d* as long as *T1* diameter. *F2* with a submedian *a* seta and a few shorter ones basad; *v* surface usually with several setulae on basal 0.75 longer and more upright than usual, but not quite so long as *F2* diameter where situated; and two long preapical *p*. *T2* with one or two short median *p*. *F3* with a series of short *av* setae on apical 0.5 which become longer apically and also more *av* to *v* placed, terminal one or two strong; *pv* surface with a series of longish setae on apical 0.33 to 0.50 which are usually longer and more closely placed than *av* series. *T3* with one *ad* and *av* bristle near middle. Tarsi long and slender, not unusually colored or modified.

Wings hyaline, faintly tinged. Node hairy on both surfaces and slightly beyond on third vein. Other veins except costa bare. Third and fourth very slightly convergent apically. Posterior cross vein very slightly undulate. Calyptrae hyaline, margins of lower ones faintly to strongly tinged with pale brown to fuscous; halteres brownish fulvous to fulvous.

Abdomen subcylindrical, tapering apically. Dorsum mostly fuscous brown, subshiny, basolateral angles of tergites 2 to 4 with bluish-gray pruinescence which becomes expansive on declivities and reduces dark area to a narrow, dark apical marginal band or line on sides. Basal sternite with a row of marginal setulae. Sternite 5 with a shallow V-shaped median suture, lateral processes without distinctive bristles.

Female: 4.2-5.2 mm. long. Similar to male. Front at vertex 0.31 to 0.37 of greatest head width, broadened to 0.42 to 0.48 at base of antennae. Posterior two pairs of parafrontal bristles backwardly and outwardly directed, others convergent. Frontal triangle obscured or reaching to base of antennae only as a narrow line; and with narrow brownish area laterad to parafrontal bristles more extensive. Oral margin more protuberant than in male.

F2 without upright *v* setae, and *F3* without any distinct *av* to *pv* bristles even at base.

Dorsum of abdominal tergite 4 with a median brown stripe, remainder bluish gray pruinescent.

Holotype, male (US 67188), allotype, female (US), 24 male and 23 female paratypes (BISHOP, US): Bonin Is., Chichi Jima, Yatsutse R. (Minato-ko), "Gen's Beach," Apr. 10-22, 1958, Snyder. Other paratypes: Chichi Jima: 11 males, four females, Sakai-ura, "Bull Beach," Apr. 5-25, 1958; 17 males, 10 females, Tatsumi Wan, S.E. Bay, Apr. 11-22, 1958; female, Okimura, "Yankee Town," Apr. 8-15, 1958. Ani Jima: two males, two females, "Commanders Beach," Apr. 22, 1958; two males, female, Southwest Bay, May 17, 1958; male, two females, Sen-Zan (N.E. Bay), May 28, 1958. Ototo Jima: two females, Kammuri-iwa (S.W. Bay), June 3, 1958. Haha Jima: two males, four females, Okimura, Apr. 26-June [error for May] 9, 1958, all Snyder; female, Ogasawara Haha, 1931, Motoike and Ise.

DISTRIBUTION: Bonin Is. (Chichi Jima, Haha Jima).

61. **Limnophora boninensis** Snyder, new species (fig. 25, *b*).

Male: 3.5-4.2 mm. long. Head black, gray pruinescent. Frontal vitta velvety fuscous brown; ocellar triangle not differentiated, posterior part of parafrontals overlaid with

a brownish pruinescent shadow; anterior part silvery pruinescent. Dorsal 0.3 to 0.5 of occiput dark, remainder gray pruinescent. Front at vertex 0.42 of head width, parallel-sided. Parafrontals with a complete row of short, convergent setae, posterior two pairs backwardly and outwardly directed, and with a few short hairs laterad to all parafrontals. Profile as in figure 25, *b*. Palpi fuscous, slender.

Thorax fuscous, dorsum subshiny fuscous brown, humeri, notopleura, and pleura gray pruinescent. *Presut ac* hairs short, in two irregular rows; *dc* normally 2 : 3, but sometimes a weak *postsut* one present between first and normal second pair. Scutellar setulae descending slightly over sides below level of bristles; without accessory *ntpl* setulae; *st* 1 : 1 or 1 : 2, only the posterior one strong. Prosternum with a row of short marginal hairs.

Legs black, rather long and slender. *F1* normal. *T1* without median *p*; apical *d* and *pv* shorter than *T1* diameter. *F2* without distinct bristles on any of the *v* surfaces, and only a very weak submedian *a* seta; two preapical *p* present. *T2* with a short median *p*; only apical *v* longer than *T2* diameter. *F3* with a very weak preapical *av* bristle, other *v* surfaces without bristles; a row of *ad* and a slender preapical *d* to *pd* bristle present. *T3* with a short median *ad* and *av*. Tarsi not unusually modified.

Wings hyaline, but distinctly tinged. Node with one or two short hairs on dorsal and ventral surfaces; other veins except costa bare. Third and fourth slightly convergent apically. Posterior cross vein straight. Calyptrae rather small, whitish hyaline, margin of lower one darkened, especially at apex; halteres fulvous brown to brown, knobs often fuscous.

Abdomen cylindrical, black; dorsum subshiny unspotted; pleura mostly gray pruinescent but dark dorsal area continued over sides and almost to ventral surface on apical one-half of pleura. Basal sternite with a row of long marginal hairs; 2 with numerous hairs and a pair of long preapical bristles; 5 with a deep broad V-shaped incision, processes without strong bristles.

Female: 4.3-4.8 mm. long. Similar to male but front at vertex about 0.65 of head width and distinctly wider than either eye. Antennae not so large but more prominent than in most female *Limnophora*.

Thoracic dorsum more brownish and normally *dc* 2 : 4, anterior two *postsut* pairs shorter than posterior two pairs. Apical margins of lower calyptrae more brownish fulvous; halteres fulvous to fulvous brown.

Legs not quite so slender as male; *F3* usually without short, weak preapical *av* setae.

Abdomen more conical and dorsum not as shiny; gray pruinescence on pleura invades basolateral angles of tergites 2 and 3 as well as a larger portion of 4.

Holotype, male (US 67189), allotype, female (US), eight male, six female paratypes (BISHOP, US): Bonin Is., Chichi Jima, Yatsuse R., Minato-ko, "Gen's. Beach," Apr. 10-22, 1958; nine males, seven females, Tatsumi Wan, S.E. Bay, Apr. 11-22, 1958; Ani Jima (Chichi Group): two males, three females, "Commanders Beach," Apr. 22, 1958; female, S.W. Bay, May 17, 1958, all Snyder. Ogasawara Haha, female, 1931, Motoike and Ise.

DISTRIBUTION: Bonin Is. (Chichi Jima).

This species could be placed in *Pseudolimnophora* on basis of the marginal hairs on the basal abdominal sternite. It will trace to *subtilis* in Stein's keys (1909, Tijdschr. Ent. **52**: 244; 1915, Suppl. Ent. **15**: 38) but until the type can be examined for several salient characters, I hesitate to determine *boninensis* as *subtilis*.

62. Limnophora dybasi Snyder, new species (fig. 25, *d*).

Male: 3.6 mm. long. Entire fly black in ground color. Viewed from in front, pruinescence on face and parafacials silvery, on parafrontals deep brownish black, on frontal vitta pale brown; frontal triangle not clearly differentiated. In profile, para-

facials with reddish-brown reflections, cheeks and occiput grayish pruinescent. In frontal view head 0.80 as wide as high; front at vertex 0.40 of head width, broadened to 0.43 at base of antennae; face parallel-sided, equal to width of front at base of antennae. In profile, juncture of parafacials and parafrontals as long as width of antennal segment 3, parafacials almost obscured below. Cheeks 0.8 as high as greatest antennal width. Parafrontals with seven pairs of bristles, anterior and posterior pairs strongest, latter posteriorly directed; a few short setulae laterad to median series. Vibrissae only moderately differentiated from adjacent bristles which are confined to ventral margin. Posteroventral portion of head prominent. Inner and outer vertical bristles and anterior ocellars well developed, subequal. Antennae inserted almost opposite top of eyes and extending to oral margin; segment 3 at least three times as long as 2. Arista almost bare, longest hairs less than 0.5 as long as greatest aristal diameter (fig. 25, *d*). Palpi long and slender. Eyes bare.

Thoracic dorsum subshiny, very sparse pruinescence brownish; not vittate; humeri light brownish pruinescent. Pleura bluish gray pruinescent except on humeri and at base of wings. *Ac* hairs strong and in two irregular rows, and a pair of prescutellar *ac* bristles, *dc* 2:3. Scutellum with moderately sparse dorsal clothing setulae which do not descend below level of marginals. *Pra* absent; without setulae adjacent to base of either *ntpl* bristle; one strong and one weak propleural and one strong stigmatal bristle; *st* 1:2, posteroventral one much weaker than posterodorsal one, latter distinctly longer and stronger than anterior *st*. Prosternum bare, or occasionally with one or two short setulae.

Legs: coxae with dense, and femora with diffuse gray pruinescence. *F1* normal. *T1* without median bristles; an apical *d* and *pv* which are slightly longer than diameter of *T1* where situated. *F2* without strong bristles or spines on *v* surfaces, but with two strong preapical *p* bristles. *T2* with one *p* bristle at or basad of middle. *F2* with one or two preapical *av* bristles, remainder of *av* and entire *pv* surfaces bare. *T3* with one submedian *ad* and *av* bristle.

Wings subhyaline, with faint brownish reflections. Costal setulae distinct. Fourth vein not curved forward; node with setulae on both surfaces and slightly beyond on third vein. Posterior cross vein at most very slightly curved, inserted at basal 0.33 of apical section of fourth vein; anterior cross vein inserted opposite apex of first vein and beyond middle of discal cell. Calyptrae hyaline; halteres yellow.

Abdominal dorsum, when viewed from above and behind, subshiny black, with sparse brownish pruinescence, and without distinct markings; but in lateral view dorsal marks are continued over side as subtriangular extensions of dorsal black bands; remainder of abdominal pleura grayish pruinescent. Second to fourth visible tergites with a row of discal and apical bristles. Basal sternite bare, or with one or two short setulae; other sternites longer than broad, silvery pruinescent and without strong apical bristles.

Female: 3.5-3.8 mm. long. Similar to male, ventral margin of head more rounded posteriorly. Abdominal bristles much shorter; apical row on segment 4 absent.

Holotype, male (US 67190), Nanpil, Net Dist., Ponape I., Mar. 13, 1948, on rocks by mountain stream, Dybas; allotype, female (US), four female paratypes (BISHOP, US, CAS), same data as type.

DISTRIBUTION: Caroline Is. (Ponape).

Except for one female paratype, specimens in the type series lack lateral hairlike prosternal setulae. It is possible that the prosternal hairs may have broken off, but even under extremely high magnification I am unable to find traces of what might be their sockets.

This species will fit best into the subgenus *Calliophrys* Kowarz, but differs from both Palaearctic species in having the parafacials almost obscured below and in different configuration of male genitalia.

63. Limnophora carolina Snyder, new species.

Female: 2.2 mm. long. Head black, gray pruinescent, except for brown front and subshiny complete triangle. Front 0.33 of head width. Anterior parafrontal, inner, and outer vertical, and anterior ocellar bristles subequal, well developed. In profile, juncture of parafacials and parafrontals distinct; parafacials much narrowed below. Cheeks very narrow, and with four or five weak, anteroventrally directed bristles along their lower margin. Vibrissae strong. Antennae black, inserted opposite dorsal 0.2 of eyes, and extending to oral margin. Segment 3 is 3.0 times as long as 2, but 3 not unusually broad or thick. Arista thickened at base, this enlarged portion about 3.0 times as long as basal aristal segment, and equal to it in diameter. Longest hairs on arista not longer than its greatest basal diameter. Palpi black. Mentum glossy black.

Thorax black; gray pruinescent on pleura, humeri, and notopleurae; dorsum including scutellum brownish fuscous except a very narrow median gray vitta, and a less distinct one in each *dc* plane. Presutural *ac* setulae well developed, and in two moderately separated rows. *Dc* 2:3. Without hairs adjacent to base of *ntpl* bristles. Scutellar clothing setulae sparse, not extending below level of marginals. *St* 1:2, posteroventral one much shorter than others.

Legs black. *F1:* preapical *pv* longer than row of short bristles basad to it. *T1:* without median bristle. *F2:* without distinct bristles except one strong preapical *p*. *T2:* one submedian *p*. *F3:* a single preapical *av* bristle; remainder of *av* and entire *pv* surface without bristles. *T3:* one short median *ad* and *av* bristle. Pulvilli and claws very small.

Wings hyaline. Costal thorns and setulae very short. Third and fourth veins subparallel to very slightly convergent. Posterior cross vein straight or very slightly sigmoid; inserted opposite basal 0.33 of first posterior cell. Node with two or three short hairs on dorsal surface. Calyptrae white; halteres pale fulvous.

Abdominal ground color dark. Dorsum of tergite 1 entirely black; 2 and 3 with a pair of triangular brownish spots which are separated in midline by a gray pruinescent vitta, and outer angle of these triangular spots extend onto lateral declivities; tergite 4 mostly gray pruinescent but with a pair of rather elongate brown spots. Basal sternite bare.

Holotype, female (US 67191), Palau Is., Babelthuap I., E. Ngatpang, 65 m., Dec. 7, 1952, light trap, Gressitt; paratypes (BISHOP, CAS): female, Koror, May 5, 1953, Beardsley; female, Ponape I., Mt. Temwetemwensekir, 180 m., Jan. 19, 1953, Gressitt; female, Truk, Moen, Civ. Ad. Area, Mar. 5, 1949, Potts.

DISTRIBUTION: Caroline Is. (Palau, Truk, Ponape).

The ventral surface of the node sometimes bears a few extremely short, fine hairs which are very much less conspicuous than the two or three on the dorsal surface and visible only under very high magnification. It is probable that the unknown male will have the front relatively broad, but I hesitate to speculate on its thoracic markings.

64. Limnophora extincta Snyder, new species (fig. 20, *g*).

Male: 2.3 mm. long. Head brownish fuscous, with brownish-gray pruinescence. Frontal vitta brownish red at base of antennae. Frontal triangle extends almost to base of antennae. Front at vertex 0.47 of head width, parallel-sided. Each parafrontal with two moderate, convergent anterior bristles, a long median divergent, and a short posterior reclinate bristle and one or two hairs laterad to anterior parafrontals. Outer verticals strong, inners weak, subequal to the forwardly directed postocellars which are more dorsally situated than usual and slightly shorter than the anterior ocellars. In profile (fig. 20, *g*) juncture of parafacials and parafrontals strongly projecting anteriorly, parafacials very much narrowed below. Cheeks as high as width of antennal

segment 3. Antennae long and broad, fuscous, apex of segment 2 brownish red, inserted opposite dorsal 0.30 of eyes and ending opposite their lower margin. Segment 3 is 3.5 times as long, and 1.0 times as wide as length of segment 2. Arista concolorous with antennal segment 3, longest hairs not quite as long as greatest aristal diameter.

Thorax fuscous brown; gray pruinescence on dorsum sparse, on humeri and *ntpl* more dense; without clearly defined vittae. Pleura densely gray pruinescent. *Presut ac* setulae in two irregular rows; *dc* 2:3; *ntpls* not setulose adjacent to bristles; *st* 1:2, posteroventral one very short and weak. Most of ventral 0.5 of sternopleura with only short, sparse setulae and ventral fringe reduced to three or four short setae. Scutellar clothing setulae sparse, not descending below level of marginals.

Legs brown. *F1* normal. *T1* without median bristles, only apical *d* subequal to *T1* diameter. *F2:* an *av* on basal 0.33, two *v* to *pv* on basal 0.5, and a single preapical *p*. *T2:* a weak median *p* seta, only apical *v* strong. *F3:* two *av* from basal 0.33 to apical 0.25; *pv* absent, with one preapical *pd* to *d*. *T3:* a weak, submedian *ad, av,* and apical *d*. Tarsi normal. Pulvilli very small.

Wings hyaline; in the single specimen they are so folded over each other that venation is obscured. Costal thorns and setulae short but distinct. Node with two or three dorsal hairs. Upper and lower calyptrae faintly tinged; subequal; halteres yellow.

Abdomen brown, base and ventral margins lighter; dorsum densely blue gray pruinescent and unmarked. Basal sternite bare. Sternite 5 with a broad, V-shaped incision, apical processes lobelike and somewhat inwardly directed.

Holotype, male (BISHOP 3560), Machanao,Guam, May 17, 1936, Usinger.

DISTRIBUTION: S. Mariana Is. (Guam).

Until more material is available, this species is hesitantly placed in *Limnophora*. The prosternum is obscured, so presence or absence of hairs on it cannot be determined, and the wings are so folded as to obscure the apical course of all veins behind the third. The strong, outwardly directed median parafrontal bristle and broad frons are suggestive of a few *Fannia* males, and all females of that genus, but the abdominal shape, leg bristling, and presence of hairs on node prevent me assigning it to that genus. *Mydaea* Robineau-Desvoidy has nodal hairs, but the thoracic marking, bristling of head, and several other characters prevent me from including it in that genus.

The type locality has been considerably modified by military installations since 1936; and since Guam has been more thoroughly surveyed than others in Micronesia, it is possible that the species is no longer present—the reason for the specific name.

Genus **Myospila** Rondani

Myospila Rondani, 1856, Dipt. Ital. Prodr. **1**: 91.—Snyder, 1940, Mus. Novitates, **1087**: 1.—Hennig, 1956, IN Lindner, Fleig. Palaearkt. Reg., Leif. 194, Muscidae **63**, b: 113.

Phasiophana Brauer and Bergenstamm, 1889, Denkschr. Akad. Wiss. Wien. Math.-Nat., Classe 58, 390.

Mydaea (*Myospila*) van Emden, 1951, Ruwenzori Exped. **2** (6) Muscidae C: 643, 646.

Type species: *M. meditabunda* Fabricius.

Bare eyes in male narrowly, in female broadly, separated. Arista plumose. *Ntpl* with a few setulae adjacent to base of posterior bristle; pteropleura bare. Fourth wing vein very gently curved forward at apex (fig. 3, *f*), the node (juncture of second and third wing veins) with setulae on dorsal and ventral surfaces. Ovipositor without dorsal thorns.

The single species described below is a somewhat aberrant member of this genus, its closest affinities being with certain Australian ones, and one or two other undescribed species from Polynesia.

65. Myospila palau Snyder, new species.

Male: 7.0-8.5 mm. long. Head almost circular in frontal view; black, grayish pruinescent, lower portion of parafacials and facial ridges sometimes reddish brown. Parafrontals broadly contiguous, front at narrowest part 1.50 to 1.75 times as wide as diameter of somewhat enlarged anterior ocellus. Parafrontal bristles reduced in length, anterior pairs longest, others extending as microscopic setulae 0.8 distance to anterior ocellus. Anterior ocellar bristles subequal to anterior parafrontals. Vertical bristles undeveloped. In profile parafacials and parafrontals obscured; cheeks 1.25 times as high as width of antennal segment 3 and with about 12 ventrally directed bristles along lower margin. Arista and antennal segments 1 and 2 fulvous brown, segment 3 yellow. Antennae inserted opposite lower 0.4 of eyes, not quite reaching opposite their lower margin. Segment 3 is 2.5 times as long as 2. Longest aristal hairs about 0.5 as long as length of antennal segment 3. Palpi black on basal 0.5 to 0.6, yellowish white on remaining apical portion, very slightly clavate and with dark, short to moderately long bristles. Eyes bare.

Thorax black, pleural sutures usually fulvous brown. Dorsum sparsely brownish gray pruinescent and with a broad, obscure lateral dark vitta on each side. *Ac* 0:1; *presut ac* setulae in about 12 irregular rows; *dc* 2:4, anterior two *postsut* pairs short; *ia* 2, anterior one very short; *pra* minute or absent; *ntpls* 2, with setulae adjacent to base of posterior bristle. Scutellar clothing setulae descend only slightly below level of marginals. Fine clothing hairs on lower 0.5 of humeri and those surrounding propleural and stigmatal bristles, yellow to golden; remaining thoracic bristles and setulae black, *St* 1:2. Beret and hypopleura below spiracle setulose; preepisternum III usually with fine pale hairs. Operculum of anterior thoracic spiracle yellowish; operculum of posterior spiracle consists of rather sparse yellowish-brown hairs, and without interspersed setulae. Prosternum bare (fig. 1, *d*).

Legs fuscous, except brownish fulvous apices of femora and mostly fulvous brown *T1*. Other succeeding tibiae becoming darker brown. *F1:* normal, without apical *av* thorns or bristles. *T1:* without median bristles; a well-developed apical *a* and a short *pv*. *F2:* one or two short median *a*; a row of short *v* to *pv* on basal 0.50 to 0.67 but none are as long as diameter of *F2* where situated. *T2:* two *p* on median 0.5. *F3:* three or four distinct *av* on apical 0.33; *pv* surface not bristled. *T3:* one short median *ad* and *av*, and often a very short *pd* bristlelike setula slightly beyond middle which is never longer than diameter of *T3* where situated.

Wings distinctly fulvous to orange at base, becoming lighter apically; basicosta and epaulet concolorous with wing base. Costal thorns absent, costal setulae very short. Fourth wing vein gently curved forward apically. Node setulose on both surfaces, and occasionally with a few setulae beyond on third vein. Other veins bare. Calyptrae and halteres light fulvous orange.

Abdomen subshiny, tergite 4 entirely fulvous to pale brown; first to third variable in extent of basal and apical fuscous bands, which are usually connected at midline by a variable, median dark stripe, remainder fulvous to brown.

Female: 7.0-8.5 mm. long. Similar to male. Head slightly broader than high. Front at vertex 0.27 of head width, broadened to 0.30 at middle. Frontal vitta velvety black.

In front view, parafrontals widest at their juncture with parafacials and at this point parafrontals are as wide as distance across posterior ocelli inclusive. A complete row of convergent parafrontal bristles, posterior pairs backwardly and outwardly directed and with a few short setulae laterad to convergent series. In profile, juncture of parafacials and parafrontals about 0.25 as long as greatest width of antennal segment 3, latter with a dark dorsoapical shadow.

Humeri often brownish to fulvous brown; and pleural sutures often more extensively light-colored than in male.

Abdomen without median stripe on tergites 1 to 3. Without well-defined rows of tergal bristles. Ovipositor without thornlike bristles on suranal plate.

Holotype, male (US 67192), Ngiwal, Babelthuap I., Palau Is., July 21, 1946, Townes; allotype, female (US), Koror I., Palau, July 7, 1946, Townes; paratypes (BISHOP, US): male, same data as type; five males, Auluptagel (Aurapushukaru) I., Palau, Sept. 1952, Krauss; female, E. Ngatpang, 65 m., Babelthuap I., Palau, Dec. 10, 1952, Gressitt; male, Koror I., Palau Is., Nov. 18, 1947, Dybas; three males, Ulimang, Babelthuap I., Palau Is., Dec. 14, 1947, on foliage by stream, Dybas; female, Kayangel (Ngajangel), Palau Is., Dec. 15, 1952, light trap, Gressitt; male, female, Koror, Palau Is., Nov. 25, 1953, Jan. 1954, at light, Beardsley; male, Koror I., Palau Is., Apr. 24, 1957, at light, Sabrosky; two males, two females, Babelthuap I., Ngerehelong I., Palau Is., May 7, 1957, Sabrosky; two males, female, Babelthuap I., Melekeiok, Palau Is., May 23, 1957, mangrove, Sabrosky; female, Babelthuap I., Melekeiok, Palau Is., May 23-24, 1957, Sabrosky; two females, Babelthuap I., Ngiwal, Palau Is., May 21, 1957, jungle, Sabrosky; female, Ngurukdabel I., Ngaremediu, Palau Is., Apr. 24, 1957, Sabrosky; female, Ngarmalk I., Palau Is., Apr. 23, 1957, at light, Sabrosky; three females, Ngaiangl A., Palau Is., May 9, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau).

The closest described relatives of *M. palau* are the Australian species *hypopleuralis* Malloch and *flavicans* Malloch; it is readily separated from both by the darkened thorax and legs. It differs from *hypopleuralis* in lacking beret hairs but *palau* has hypopleural hairs below spiracle and lacks a strong dark bristle in the posteroventral corner of the posterior thoracic spiracle. It differs from *flavicans* in having hypopleural hairs and the fourth wing vein more strongly curved forward. Numerous other differences will be seen when compared with my redescription of these two Australian species (Snyder, 1940, Am. Mus. Novitates **1087**: 1-4). There are at least two undescribed Polynesian species before me to which it is more closely allied.

Genus **Dichaetomyia** Malloch

Dichaetomyia Malloch, 1921, Ann. Mag. Nat. Hist. IX, **7**: 163; 1925, Philippine Jour. Sci. **26**: 321; 1925, Australian Zool. **3**: 322; 1928, Ent. Mitteil. **17**: 317; 1929, Insects of Samoa **6** (3): 170; 1929, Treubia **7**: 400.—van Emden, 1942, Ann. Mag. Nat. Hist. XI, **9**: 677.—Bohart and Gressitt,

1946, Ent. Soc. Am., Ann. **39**: 418; 1951, B. P. Bishop Mus., Bull. **204**: 108.—Hennig, 1952, Beitr. zur Ent. **2**: 82.
Lophomala Enderlein, 1927, Konowia **6**: 55.

Type species: *D. polita* Malloch.

Arista plumose. Front narrow or broad in male, broad in female. Oral margin and juncture of parafacials and parafrontals not strongly protruding. Parafrontals of female with two posterior pairs of backwardly and outwardly directed bristles, of which anterior is usually much shorter than outer and both shorter than inner and outer verticals; of male usually with a single pair of short preocellar hairs in addition to a row of convergent bristles. Prosternum and pteropleura hairy. Operculum of posterior thoracic spiracle with several long, dark interspersed hairs or setae. Infra-alar bulla bare (figs. 1, *a, b*; 2, *d*). Fourth wing vein very slightly deflected anteriorly near apex; third vein with a few hairs on ventral surface beyond node; sixth and seventh maintained at least 0.75 distance to anal margin; first and stem vein bare.

Usually some part of body yellow to fulvous, predominately so in many species. Species usually more than 4.5 mm. long.

This genus is apparently confined to the tropical or subtropical areas of the Ethiopian, Oriental, and Australian regions. It shows its closest affinities in structure and habits with several groups of Neotropical Cyrtoneurini.

Adults are most frequently found on human feces in dense shade, or resting on vegetation along jungle paths. Bohart and Gressitt (1951, p. 108) did not rear either of the species which they described from Guam, though adults were attracted to human feces or carrion. Ethiopian species "develop in cattle dung, . . . and an Oriental species is said to attack pyralid larvae boring in paddy stems" (van Emden, 1942, Ann. Mag. Nat. Hist. XI, **9**: 675). Adults are also common on rotting bread fruit and occasionally seen on mangrove roots in west Africa. It is probable that intensive collecting near decaying fruit or other vegetable material, as well as in mangrove swamps in Micronesia, may well yield species of *Dichaetomyia* not included in the present collection.

The exact status of the mostly or entirely fulvous "species" in the genus will probably be determined only after the establishment of laboratory colonies which will enable crossing experiments to be made. This seems the only proper course to determine whether or not slight differences in bristling and color pattern represent specific differences or only mutants which have become established in the population.

Key to Micronesian Species of Dichaetomyia

MALES

1. Narrowest part of front at least twice as wide as distance across posterior ocelli inclusive; abdomen entirely yellow, legs entirely fuscous (fig. 27, *c*) .... **66. rota**
   Narrowest part of front not wider than distance across posterior ocelli inclusive, parafrontals contiguous or subcontiguous near middle; not colored as above 2

2(1). Legs black to fuscous brown, at most knees fulvous 3
   Legs with *F1, T1,* or more yellow 4

3(2). Scutellum yellow to fulvous; abdomen entirely yellow........................**67. nigroscuta**
Scutellum black; the basal one or two abdominal segments black....**68. sabroskyi**

4(2). Abdomen entirely fulvous to yellow..5
Abdomen partly fuscous to black*...7

5(4). *F3* with four or five median *pv* bristles (fig. 10, *g*)..6
F3 with *pv* clothing hairs only (fig. 10, *f*)..**69. rufa**

6(5). *Dc* 2: 3; pleurotergite below lower calyptrae bare....................................**71. carolina**
Dc 2: 4; pleurotergite below lower calyptrae with several short hairs.............
....**72. mariana**

7(4). *Dc* 2: 3...**70. apicalis**
Dc 2: 4...8

8(7). Abdominal tergite 4 entirely black; *T3* fulvous....................................**73. trukensis**
Abdominal tergite 4 with at least margin yellow to fulvous; *T3* brown to black 9

9(8). *F2* and *F3* entirely fulvous; apical *pv* on *T1* clearly defined and as long as *T1* diameter...**74. saperoi**
F2 and *F3* darkened on median 0.25 or more; apical *pv* of *T1* not differentiated ....**75. yapensis**

FEMALES

1. Legs black to fulvous...2
Legs mostly yellow to fulvous...3

2(1). Abdomen fulvous; knobs of halteres yellow to fulvous............**67. nigromaculata**
Abdomen fuscous; knobs of halteres fuscous...**68. sabroskyi**

3(1). Abdomen entirely yellow to fulvous in ground color...4
Abdomen with fuscous marks..5

4(3). *T3* brown to fuscous and distinctly darker than fulvous *F3*; antennal segment 3 darkened on dorsal 0.5 or more of its upper surface..........**72. mariana**
T3 and *F3* concolorous, yellow to fulvous; antennal segment 3 entirely yellow or with only an indistinct dark apical shadow...................................**69. rufa**

5(3). *Dc* 2: 3..**70. apicalis**
Dc 2: 4...6

6(5). *F2* and *F3* entirely fulvous..7
F2 and *F3* partly or entirely fuscous...**75. yapensis**

7(6). *T3* and hind tarsi fuscous to black, in sharp contrast with fulvous *F3*; fourth visible abdominal tergite with a conspicuous fulvous central area on apical 0.5 or more; antennal segment 3 with dark apical shadows......
....**74. saperoi**
T3 and hind tarsi concolorous with *F3*, at most basal 0.5 or less of *T3* slightly brownish; fourth visible abdominal tergite black, except at base or with only a narrow apical band which does not reach beyond pores of apical bristles; antennal segment 3 without a dark apical shadow............
....**73. trukensis**

66. **Dichaetomyia rota** Snyder, new species (fig. 27, *c*).

Male: 5.3 mm. long. Head black, with gray pruinescence dense, except on occiput and frontal vitta. Front at vertex 0.19 of head width, narrowed to 0.16 near middle and then broadened to 0.25 at base of antennae. Each parafrontal slightly wider than diameter of anterior ocellus, or 0.33 width of frontal vitta; with six bristles which decrease in length and strength from base of antennae to vertex; posterior one back-

* Postmortem decay of viscera or mesenteries, tardy pinning, or greasing of specimen may produce irregular dark areas on an otherwise yellow abdomen and should not be confused with the regular dark color pattern.

wardly and outwardly directed; others convergent to very slightly reclinate. In profile, only juncture of parafacials and parafrontals clearly defined, and is only as long as diameter of arista. Cheeks 0.8 as high as greatest width of broad antennal segment 3. Antennae fulvous, somewhat yellowish near base of arista, inserted opposite dorsal 0.47 of eyes, ending opposite their lower margin. Antennal segment 3 is 2.3 times as long as 2, and at its widest part equal to length of 2. Arista yellow, longest hairs on both surfaces, including aristal diameter, 0.8 as long as length of antennal segment 3; and longest hairs on one surface 0.9 as long as greatest width of antennal segment 3. Palpi slender, fuscous brown, slightly darker than subshiny mentum.

Thorax fulvous, slightly grayish pruinescent on anterior 0.5 of *presut* portion; with three ill-defined castaneous streaks: a median one and a pair of *postsut* ones between *ia* and supraalar planes. Pleura fulvous except for a small castaneous spot near ventral portion of posterior margin of sternopleura; *ac* 0.1; *dc* 2:3; *ia* 2; *pra* subequal to posterior *ntpl*; with a few short setulae adjacent to base of the two *ntpl*; scutellar setulae descend scarcely below level of marginals; *st* 1:2. Pleuratergite, below root of lower calyptrae, with a few very short, dark hairs which are visible only under the most favorable lighting conditions and angle of vision (a slight posterodorsal view against light). Preepisternum III with one or two short, indistinct, pale hairs. Remainder of hypopleura bare. Hairs and bristles on mesopleura, pteropleura, and sternopleura dark.

Legs dark; *F1* fuscous, tibiae and tarsi dark brownish, articulations shiny fulvous brown; mid and hind coxae with basal fulvous streaks. *F1* without *av* bristles. *T1* without median bristles, but with a strong apical *ad* in addition to apical *d* and *pv* bristles. *F2* without well-defined *av* bristles; with one or two *pv* setulae on basal 0.5 as long as height of *F2* where situated and others in this plane short, decumbent. *T2* with two median *p*. *F3*: *av* surface with two to four strong bristles on apical 0.33; basal 0.67 with a few widely spaced, shorter slender hairs, and although basal one or two are occasionally upright, they are not as long as *F3* height; two *pv* bristles just basad to middle are longer than *F3* height. *T3*: one *ad* and one or two *av*. Tarsi not modified. Pulvilli smaller than tarsal segment 5.

Wings yellowish hyaline, not clouded. One or two hairs on ventral surface of node; other veins, except costa, bare. Posterior cross vein very slightly sigmoid. Fourth vein slightly deflected anteriorly. Calyptrae fulvous yellow; halteres yellow.

Abdomen entirely fulvous, unmarked. Basal sternite setose.

Holotype, male (BISHOP 3561), Rota I., Mariana Is., July 20, 1925, Hornbostel.

DISTRIBUTION: S. Mariana Is. (Rota).

The comparatively broad male frons (fig. 27, *c*) will separate males of this species from all other Micronesian *Dichaetomyia* before me.

Dichaetomyia latifrons Malloch (1928, Ann. Mag. Nat. Hist. X, **1**:468) and *pallitarsis* Stein (1909, Tijdschr. Ent. **52**:236) are the only species with broad male frons in adjacent geographical regions. The following key will separate these three species.

1. *T1* with a median *p* bristle; abdomen entirely black; anterior two pairs of *postsut dc* bristles much shorter than posterior two pairs 2
   T1 without a median *p* bristle; abdomen entirely yellow; three pairs of *postsut dc* subequal, anterior *postsut* pair not conspicuously reduced in length (Marianas) .... **rota**
2. Humeri yellow in contrast to dark thoracic dorsum; *T3* with two *ad* median bristles (Java, Sumatra, Philippines) .... **pallitarsis***
   Humeri black, concolorous with thorax; *T3* with one *ad* bristle (Africa: Uganda) .... **latifrons**

* Reference to *pallitarsis* from Africa by Stein probably refers to *surgens* Stein 1913; see van Emden, 1951, Ruwenzori Expedition 2 (6): 681.

67. Dichaetomyia nigroscuta Bohart and Gressitt.

Dichaetomyia nigroscuta Bohart and Gressitt, 1946, Ent. Soc. Am., Ann. **39**: 421; 1951, B. P. Bishop Mus., Bull. **204**: 108.

Head black, gray pruinescent. Antennae brownish yellow to fulvous, segment 2 in female lighter than 3; concolorous or darker than 3 in male. Palpi dark. Front in male narrower than distance across posterior ocelli (? single male teneral); in female, front at vertex one-fourth of head width (not four-fifths as given in original description) broadened to about one-third at base of antennae. Male parafrontals apparently with one strong anterior pair of bristles, two or three short hairs behind, and a short pair just anterior to anterior ocellus.

Thorax fuscous to brownish fuscous, except yellowish on humeri, scutellum, a variable area over postalar declivities, and along supraalar plane, especially in male. *Dc* 2:3; *pra* about 0.5 to 0.6 as long as posterior *ntpl* bristle, which is subequal to anterior *ntpl*; a few setulae adjacent to base of both *ntpls*. Sides of scutellum without numerous setulae descending onto ventral portion of declivities.

Legs fuscous, but articulations of *F* and *T* yellow to fulvous. *T1* without median *p*, apical *pd* shorter than *d* and *pv*, and not quite as long as *T1* diameter. *F1* without a well-defined series of *av* bristles on apical 0.25 or less in either sex. *F3* with one to three short *av* bristles on basal 0.25, and two to four much stronger ones on apical 0.33; basal 0.25 to 0.33 with one or two long, strong *v* to *pv* bristles.

Wings yellowish to fulvous, darker in female. Abdomen entirely fulvous yellow.

DISTRIBUTION: Southern Mariana Is.

S. MARIANA IS. GUAM: female, Mt. Santa Rosa, 133 m., *Pandanus* thicket (type); female, Yigo, Sept. 1937; male, Dededo, Oct. 1938, on leaf, Oakley.

Bohart and Gressitt (1946) record taking a female paratype in a trap, baited with dead toads in the woods, altitude 150 ft., at Mungmung, Guam.

This species is closely allied to the west African *D. conoformis* Curran (1935, Am. Mus. Novitates **776**: 16) in most structural and color characters. The latter species has the basal *pv* bristles on *F3* longer and stronger and reaching to middle; a median *v* to *pv* bristle is present at middle in addition to the basal bristle. The scutellum is shiny brown on sides, but becomes darker dorsally. The tibiae are lighter colored than the femora. Both species occur in deep shade and are presumably saprophagous or copraphagous.

68. Dichaetomyia sabroskyi Snyder, new species.

Male: 6.5 mm. long. Head black, sparsely gray pruinescent. Parafrontals broadly contiguous along most of their length; narrowest part of front subequal to diameter of anterior ocellus. In profile, parafacials and parafrontals obscured; short, hairlike parafrontal setulae continued only to contiguous portion of parafrontals. Cheeks as high as width of antennal segment 3. Antennae fulvous yellow, densely gray dusted, base of segment 2 slightly darker, often concolorous with arista. Antennae inserted opposite dorsal 0.38 of eyes and end opposite their lower margin; segment 3 is 2.5 times as long as 2. Longest aristal hairs on both surfaces, including aristal diameter, subequal to length of antennal segment 3. Palpi black, slender, proportion of narrowest to widest part 1.0:1.2. Mentum black, slightly grayish pruinescent.

Thorax black, gray pruinescent; narrowly brown on humeri adjacent to the suture which separates it from the *ntpl*, along suture separating mesopleura and pteropleura, at center of pteropleura, and anterior portion of beret. Without clearly defined dorsal vittae. Scutellum entirely black. *Ac* 0.1; *dc* 2:3; *ia* 1 or 2, when present, anterior one often short; *pra* 0.50 to 0.66 as long and strong as posterior *ntpl* and with setulae adjacent

to base of posterior *ntpl.* Scutellar setulae descending only slightly below level of marginal bristles and never lower than middle of declivitous portion. Pleuratergite below root of calyptrae with six or more dark hairs; *St* 1 : 2, all bristles and hairs on pleura dark.

Legs black, articulation of femora and tibiae shiny brown; *T1* fuscous brown basally. *F1* without apical *av* spines. *T1* without median bristles. *F2:* three or four *pv* bristles on basal 0.33 which are as long as *F2* height. *T2* with two median *p*. *F3:* a complete row of *av* and *pv* bristles which are at least as long as height of *F3* where situated. *T3:* one *ad,* and three *av* median bristles. Tarsi not unusually modified. Pulvilli subequal to, or larger than, tarsal segment 5.

Wings hyaline, suffused with yellow fulvous, especially near base, but without distinct spots or clouds. All veins except costa bare. Posterior cross vein very slightly sigmoid. Calyptrae bright fulvous; stalks of halteres pale yellow, knobs brownish, but darker at the junction of stalk.

Abdomen: tergites black except segment 4 and a variable apical portion of 2 and 3 fulvous. Sternite 5 fulvous, others fuscous. Basal sternite hairy; 2 to 4 longer than broad, and with a pair of strong apical bristles and some shorter lateral subapicals; sternite 5 with a broad U-shaped incision, and a short setulose hair at base of each process. Hypopygium fulvous.

Female: 6 mm. long. Very similar to male. Front at level of posterior ocelli 0.25 of head width, broadened to 0.30 at base of antennae. Frontal vitta black, sparsely gray pruinescent and with only a trace of a frontal triangle which does not extend more than 0.67 length of front. Parafrontals very narrow; with three strong convergent bristles on anterior 0.7 between which are a few weak hairs. Antennal segment 3 reddish fulvous to fulvous brown.

Humeri more extensively brown than in male, but thorax otherwise similar.

Third vein sometimes with a single short hair beyond node on ventral surface.

Abdomen similar to male; often with a median basal dark shadow on third visible tergite. Apical lateral bristles on sternites 2 to 4 not so well developed.

Holotype, male (US 67193), allotype, female (US), paratypes (BISHOP, US): three males, female, Ngaremediu, Ngurukdabel I., Palau Is., Apr. 24, 1957, Sabrosky; two males, three females, Ngaremlengui, Babelthuap I., Palau Is., June 2, 1957, Sabrosky; male, female, Imeliik, Netkeng, Babelthuap I., Palau Is., June 5, 1957, Sabrosky; male, Ngiwal, Babelthuap I., Palau Is., jungle, May 21, 1957, Sabrosky; male, Auluptagel (Aurapushekaru) I., Palau, Sept. 1952, Krauss; female, E. Ngatpang, 65 m., Babelthuap I., Palau, Dec. 10, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Palau).

69. **Dichaetomyia rufa** (Stein). (Figures 1, *a, b*; 10, *f*.)

Spilogaster rufa Stein, 1900, Term. Füzetek **22** : 132.

Mydaea rufa Stein, 1918, Mus. Nat. Hungarici, Ann. **16** : 185.

Dichaetomyia rufa, Malloch, 1925, Australian Zool. **3** : 326; 1929, Treubia **7** : 405; 1929, Insects of Samoa **6** (3) : 171.—Curran, 1936, Calif. Acad. Sci., Proc. IV, **22** : 57.

Male: Head black, grayish pruinescent. Antennae yellow. Arista yellowish brown. Palpi yellowish on a variable apical portion. Thorax and abdomen fulvous to yellow, former with sparse gray pruinescence at middle of presutural portion of dorsum. Legs concolorous with thorax, tarsi somewhat brownish fulvous. Wings hyaline to yellowish, especially along anterior margin, but this region not clearly defined by abrupt change of color. Calyptrae concolorous with thorax, more fulvous than anterior margin of wing and margins not darkened; halteres yellow to fulvous.

Eyes broadly contiguous along most of front, which is about as wide as diameter of anterior ocellus. Parafrontal hair near anterior ocellus not longer than hairs on ocellar tubercle. In profile, antennae inserted slightly below middle of eyes (ventral 0.46); segment 3 is 2.4 to 2.6 times as long as segment 2. Longest hairs on both surfaces of arista, including its diameter, as long as antennae.

All thoracic bristles and hairs black to fuscous, except for fringe on prosternum, short hairs on preepisternum III, and opercula of spiracles, which are pale. *Ac* 0:1; *dc* 2:4, *postsut* pairs not divided in two obviously long and short pairs; *ia* 2, anterior one slightly longer than *pra* and subequal to posterior *ntpl*; *pra* 0.25 to 0.33 as long as anterior *ntpl*. Scutellar setulae descend scarcely onto lateral margin (fig. 1, *b*); occasionally with one or more short hairs on pleuratergite below root of lower calyptra.

F1 without *av* bristles. *T1* without either median bristles or an apical *pd*. *F2* without clearly defined short *a* bristles; *av* surface without clearly defined bristles or setulae; *v* to *pv* surface with a row of clearly defined setulae which are not more than 0.5 as long as *F2* height, and with a few *pv* to *p* setulae on apical 0.5 which are about as long as opposite ones on *v* to *pv* surface. *T2* with two median *p*. *F3* with three or four *av* bristles on apical 0.25 to 0.33, and without clearly differentiated *pv* bristles (fig. 10, *f*). *T3* with one *ad* and one, occasionally two, median *av* bristles.

Ventral surface of node and third wing vein on basal 0.5 or less with a few short hairs. Posterior cross vein slightly sigmoid.

Female: Head similar to male, but front at vertex about 0.25 of head width and broadened to 0.33 at base of antennae. Parafrontal and vertical bristles as usual, but stronger and more numerous. Bristles and setulae on *T2* and *T3* shorter and weaker than described for male.

DISTRIBUTION: New Guinea, Australia, Samoa, Fiji Is., Anuda I., Nupani Reef Is., Matema Is., Buru Is., S. Mariana Is., Caroline Is., Marshall Is.

S. MARIANA IS. TINIAN: Two, Dec. 1952, Clarke; Nov. 1952, Beardsley.

PALAU. 42. BABELTHUAP: Ulimang, Dec. 1947, Dybas; Ngatpang, Nov. 1951, at cut coconuts, Gressitt; Ngaremlengui, June 1957, Sabrosky; Melekeiok, May 1957, Sabrosky; Airai, Ngerimal R., May 1957, Sabrosky; Ngarsung, May 1957, Sabrosky; Imeliik, Netkeng, June 1957, Sabrosky; Ngiwal, May 1957, Sabrosky; Ngerehelong, May 1957, Sabrosky. KOROR: Aug., Sept., Dec. 1952, May 1953, Beardsley; Apr., May 1957, Sabrosky; southwestern part, 25 m., Dec. 1952, light trap, Gressitt. PELELIU: Aug. 1939, Esaki; Aug. 1945, Baker; 1933, Yoshino; north end, May 1957, Sabrosky. NGERKABESANG: May 1957, Sabrosky. NGAIANGL: May 1957, Sabrosky. ULEBSEHEL: Southeast part, Apr. 1957, Sabrosky. MALAKAL: May 1957, Sabrosky. ANGAUR: Feb. 1948, Dybas.

YAP. 16. YAP: Aug. 1952, Krauss; Kolonia, July-Aug. 1950, Goss; Southern part, July-Aug. 1950, Goss; Ruul, July-Aug. 1950, Goss. RUMUNG: June 1957, Sabrosky. MAP: Southern part, July-Aug. 1950, Goss.

CAROLINE ATOLLS. 27. SONSOROL: Sept. 1952, Krauss. NGULU: Ngulu I., Oct. 1952, Krauss. ULITHI: Mogmog I., July 1946, Townes; Fassarai I., July 1946, Townes; Oct. 1952, Krauss. FAIS: Oct. 1952, Krauss. WOLEAI: Falalis I., Sept. 1952, Krauss. UTEGAL: July 1946, Townes. IFALIK: Ifalik I.,

July 1953, Bates. FARAULEP: Faraulep I., Sept. 1952, Krauss. LAMOTREK: Lamotrek I., Feb. 1953, Beardsley. PINGELAP: Jan. 1953, human feces, Gressitt.

TRUK. 16. WENA (Moen): Feb. 1948, Maehler; July 1946, Townes; Civ. Ad. Area, Mar., Apr. 1949, Potts; South Valley, Mt. Tonaachau, Apr. 1949, Potts. TOL: Mt. Unibot, Dec. 1952, Jan. 1953, Gressitt.

PONAPE. 21. July 1949, Potts; Colonia, July 1949, Owen; Jan. 1938, Kuya, Esaki; June-Sept. 1950, Adams; Auak, Aug. 1946, Townes; Matalanim, Jan. 1938, Esaki; Colonia-Palikir, July 1939, Esaki; Palikir-Ronkiti, July 1939, Esaki; Matalanim-Nipit, Jan. 1938, Esaki; Mt. Temwetemwensekir, 180 m., Jan. 1953, Gressitt; S. E. Nanponmal, Jan. 1953, human feces, Gressitt.

KUSAIE. Nine. Lele, Aug. 1946, Oakley; Hill 541, 165 m., Apr. 1953, Clarke; Sensrik, 1 m., Apr. 1953, Clarke; Lele, July 1949, Owen; Malem, Dec. 1937, Esaki.

MARSHALL IS. 26. KWAJALEIN: Ennulab, Aug. 1944, Hall, Dec. 1952, Clarke. NAMU: Namu I., Oct. 1953, Beardsley. AILINGLAPALAP: Ailinglapalap, Oct. 1953, Beardsley; Wotje I., Oct. 1953, Beardsley. MAJURO: Uliga, Oct. 1953, Beardsley. ARNO: Ine I., Oct. 1953, Beardsley, July 1950, La Rivers. JALUIT: Elizabeth I., Sept. 1953, Beardsley; Imrodj I., Aug. 1946, Townes. EBON: Ebon I., Sept. 1953, Beardsley. MILI: Alu I., Oct. 1953, Beardsley.

D. rufa was originally described from New Guinea. The original description, made during the early years of Stein's study of extra-European fauna [see Malloch, Insects of Samoa **6** (3) : 171], is not sufficient for its recognition, and the subsequent destruction of muscoid Diptera types in the Hungarian National Museum makes the identification of this species extremely difficult. I have followed Malloch's identification of this species in using this name for the specimens enumerated above.

70. Dichaetomyia apicalis (Stein). (Figure 20, *e.*)

Spilogaster apicalis Stein, 1904, Tijdschr. Ent. **47**: 103.

Mydaea apicalis Stein, 1918, Mus. Nat. Hungarici, Ann. **16**: 151, 182.

Dichaetomyia apicalis, Malloch, 1925, Australian Zool. **3**: 325, 326; 1925, Philippine Jour. Sci. **26**: 324, 331.

Male: Head fuscous, but sometimes brownish adjacent to vibrissae; gray pruinescent. In frontal view, head almost round. Front at narrowest part not wider than diameter of anterior ocellus. Parafrontals: broadly contiguous; with a pair of strong anterior bristles and a somewhat shorter pair midway to contiguous portion of parafrontals, between these and contiguous part are several irregular short hairs and setae. Posterior pair of reclinate hairs situated about 0.5 or less length of ocellar tubercle beyond anterior ocellus. Anterior ocellar bristles about 0.5 as long as anterior parafrontals. Postocellar setulae subequal to pair of parafrontal hairs anterior to ocellar triangle. In profile, parafacials and parafrontals scarcely visible and their juncture extends anteriorly scarcely more than diameter of arista. Cheeks at least as high as width of antennal segment 3. Antennae yellow, gray pruinescent; inserted

slightly below middle of eyes (profile) and extending to opposite their lower margin. Arista fulvous brown; longest hairs on both surfaces together as long as length of antennae. Palpi fulvous brown. Eyes bare, facets surrounding contiguous portion of parafrontals more enlarged than peripheral ones.

Thorax fulvous to yellow fulvous; with sparse white pruinescence. *Dc* 2:3, occasionally with a short seta between first and second postsutural pairs on one or both sides; prescutellar *ac* bristles present; *ac* setulae in 8 to 10 irregular rows; *ia* 2; *pra* less than 0.7 as long as posterior *ntpl* and with more setulae adjacent to insertion of posterior than anterior bristles. *St* 1:2. Scutellar setulae do not descend to middle of declivitous portion. Prosternal hairs usually short, slender, and pale. Entire hypopleura bare. Infrasquamal region bare, or with a few dark hairs just below calyptrae.

Legs concolorous with thorax, except tarsi are usually fuscous and *T3* is fulvous to brown to a variable extent. *F1* without *av* bristles. *T1* without median *p* or apical *pd* bristles. *F2:* without basal or median *a* bristle and a single preapical *ad*; ventrally with only a few hairs or setulae at base which are longer than clothing setulae; with four or five apical to preapical *d* to *p* bristles. *T2:* two *p* bristles on median 0.33; apical *v* longer than other apical bristles. *F3:* *av* series limited to apical 0.5 and usually becoming longer toward apex; *pv* surface with a row of slender hairs at, or slightly beyond, median 0.33, which are about as long as height of *F3* where situated. *T3* with median *ad* longer and stronger than adjacent *av*.

Wings brownish yellow, sometimes darker adjacent to second and costal vein, but without a clearly defined costal cloud. Middle of posterior cross vein slightly deflected toward base of wing. Node and ventral surface of third vein beyond it with a few short hairs. Calyptrae concolorous with darkest part of wing; halteres fulvous yellow.

Abdomen mostly fulvous to yellow, except almost entirely black tergite 4, the darkened apical areas on tergite 3 and sometimes on 2. Sternites 1 to 4 fulvous; basal one hairy; 2 to 4 with strong apical and preapical bristles; 5 fuscous and with a broad U-shaped incision.

Female: Colored as in male, but tarsi usually lighter. Frontal vitta velvety brown to fuscous. Front at vertex 0.28 to 0.30 of head width, broadened to 0.32 to 0.36 at base of antennae. One pair of strong anterior parafrontal bristles, and four or five pairs of shorter ones behind, which extend to the two strong, posterolaterally directed posterior pairs; with one or two irregular rows of short hairs laterad to convergent parafrontal bristles. Profile as in figure 20, *e*. Palpi fulvous.

T2 with two or three median *p* bristles; *F3* without prominent *pv* bristles.

Abdominal tergites 1 and 2 fulvous, except a narrow brown to fuscous band on 2; 3 fulvous basally, with a dark apical band varying from 0.3 to 0.6 length of tergite; 4 entirely subshiny brown to black, though sometimes with a very limited fulvous basal area.

DISTRIBUTION: Java, Sumatra, Australia, Philippines, Caroline Is.

CAROLINE ATOLLS. Nine. SATAWAN: Satawan I., Nov. 1952, Beardsley. NOMWIN: Nomwin I., Feb. 1954, Fananu I., Feb. 1954, Beardsley.

TRUK. 127. WENA (Moen): Feb. 1948, Mar. 1949, Maehler; Civ. Ad. Area, Feb.-Apr. 1949, Potts; Mt. Chukumong, Feb. 1949, Potts; South Valley, Mt. Tonaachau, Apr. 1949, Potts; Mt. Teroken, northern part, 7-80 m., Feb. 1953, Gressitt; Wela, July 1939, Esaki. TON (Tol): Mt. Unibot, 200 m., Dec. 1952, light trap, Gressitt; 25-50 m., Jan. 1953, Gressitt; human feces, Feb. 1953, Gressitt. FEFAN: Mt. Iron, 180 m., Jan. 1953, human feces, Gressitt. PATA: Sabote-Epin, Apr. 1940, Yasumatsu and Yoshimura. TONOAS (Dublon, Toloas): Feb. 1948, Maehler; Oct. 1952, Beardsley; Katua, July 1939, Esaki. NAMU: Namu I., Oct. 1952, Beardsley.

The *T3* and palpi vary considerably in the amount of infuscation, but there is no correlation of this variability with distribution on Truk or the other Caroline Islands.

71. Dichaetomyia carolina Snyder, new species.

Male: 4.7 mm. long. Head and thorax as in *apicalis* except pleuratergite below lower calyptrae (infrasquamal region), without short hairs or setulae. Legs and wings as in *apicalis*.

Abdomen fulvous, without dark bands.

Holotype, male (BISHOP 3562), and two male paratypes (BISHOP, US), Nomwin A., Fananu I., Feb. 17-18, 1954, Beardsley; male, Truk, Pis I., June 3, 1946, Townes.

DISTRIBUTION: Caroline Is. (Nomwin Atoll; Truk).

The specimen from Pis I. was taken "sweeping, low coral island, wet, with bush undergrowth," according to Townes.

72. Dichaetomyia mariana Snyder, new species.

Male: 5.5 mm. long. Head black, grayish pruinescent. Front at narrowest part as wide as diameter of anterior ocellus. Parafrontals contiguous along most of their length; anterior three to five pairs of bristles become shorter from base of antennae to contiguous portion of parafrontals; parafrontals bare behind except for a pair of very short hairs situated about length of ocellar tubercle in front of anterior ocellus, and are not so long as hairs on ocellar tubercle. In profile, parafrontals not distinguishable; parafacials only narrowly distinct, juncture of the latter with parafrontals at most only as long as greatest aristal diameter. Cheeks as high as width of antennal segment 3. Antennae fulvous, grayish pruinescent; inserted opposite dorsal 0.46 of eyes and end slightly above their lower margin; narrow antennal segment 3 is 2.6 times as long as 2. Arista slightly darker than antennae; longest hairs on both surfaces, including aristal diameter, longer than antennal segment 3, but not quite as long as length of antennae. Palpi slender; fulvous brown, darker than partly shiny, fulvous mentum. Eyes bare; in frontal view facets first laterad to juncture of parafacials and parafrontals distinctly enlarged, but others gradually become smaller toward outer declivitous portion.

Thorax fulvous, with sparse grayish pruinescence which is densest on anterior 0.5 or more of central *presut* area; without clearly defined vittae. *Ac* 0:1; *dc* 2:4; *ia* 2, strong; *pra* not more than 0.67 as long and strong as posterior *ntpls*; anterior *ntpl* slightly longer than posterior one, and several setulae adjacent to base of both. Scutellar setulae do not descend below level of marginals. *St* 1:2. Hypopleura bare; preepisternum III with a few short, pale hairs. Setulae and bristles on mesopleura, pteropleura, and sternopleura dark. Pleurotergite below root of lower calyptrae with several dark hairs.

Legs fulvous; tarsi darker and *T3* light brown. *F1* without *av* bristles. *T1* without median *p*, or apical *ad* bristles. *F2* without a clearly defined *av* row of bristles; *v* to *pv* surface with one basal bristle and two or three slender ones just before middle, which are at least as long as *F2* diameter where situated, and with a few shorter but distinct setulose hairs between and beyond them. *T2* with two median *p* bristles. *F3* with an *av* series becoming longer from middle to apex; and four to six long *pv* near middle. *T3* with a long *ad* and a shorter median *av* bristle. Tarsi not modified. Pulvilli of fore legs subequal to tarsal segment 5 but pulvilli of mid and hind tarsi become proportionally shorter.

Wings hyaline, very faintly yellow, especially adjacent to anterior margin of wing. Node, and ventral surface of third vein, with one to three short hairs; other veins except costa bare. Posterior cross vein distinctly, but not strongly, sigmoid. Calyptrae somewhat yellowish fulvous and a limited outer region of the margin of upper one somewhat brownish; halteres fulvous, yellow basad.

Abdomen entirely fulvous, unmarked. Basal sternite bare.

Female: 5.5-5.7 mm. long. Front at vertex 0.25 of head width, broadened to 0.28 at base of antennae. Frontal triangle subshiny, short, reaching very slightly beyond anterior of two posterior, posterolaterally directed parafrontal bristles. Antennal segment 3 with a dark apical shadow of variable extent. Vertical and ocellar bristles very strong. Palpi somewhat paler in color, and slightly broader preapically than in male. The *pv* bristles on *F2* and *F3* distinct but shorter and weaker than in male.

Holotype, male (BISHOP 3563), allotype, female, and paratypes: two females, Mariana Is., Rota I., July 20, 1925, Hornbostel; female, topotypical, but July 22, 1925.

Other specimens: N. Mariana Is., 10 females, Agiguan, May 24, 1952, human feces, Peterson, Nov. 1955, Davis; female, Agrihan I., July 26, 1951, Bohart. S. Mariana Is., female, Saipan, Halaihai-As Teo, Feb. 4, 1945, Dybas; female, Asan, Aug. 22, 1936, Swezey; female, Ritidian, Jan. 1946, human feces, Gressitt. Truk, Ton (Tol) I., female, Mt. Unibot, 32 m., Jan. 4, 1953, light trap, Gressitt.

DISTRIBUTION: N. Mariana Is. (Agiguan, Agrihan), S. Mariana Is. (Saipan, Guam), Caroline Is. (Truk).

Dichaetomyia mariana differs from *terraeregina* Malloch (1925, Australian Zool. **3**: 325) in having both *postsut ia* strong, while in *terraeregina* the anterior one is short, and the *F3* in the latter species has two or three strong *pv* on apical 0.33; from *flavihirta* Malloch (1925, Australian Zool. **3**: 326) in having the pleural hairs dark, and not yellow as in *flavihirta*; the eye facets are larger in the latter species, the calyptrae are an intense yellow fulvous, and the *pv* bristles at middle of *F3* are very short; from *megophthalma* Malloch (1925, op. cit., 325) it differs in having the large eye facets not dominating the entire dorsal 0.5 of eyes, and in lacking long *av F3* bristles at base.

73. **Dichaetomyia trukensis** Snyder, new species (fig. 10, *g*).

Male: 5.2 mm. long. Head: fuscous, except somewhat brownish cheeks; all parts gray pruinescent. Front at narrowest part not wider than diameter of anterior ocellus. Parafrontals: contiguous at middle of front; three short anterior bristles and a small hair between each, and another hair at beginning of contiguous portion of parafrontals; reclinate pair of posterior hairs about 0.5 as long and strong as anterior ocellar bristles and situated at a distance equal to anterior ocellar diameter in front of ocellar tubercle. In profile parafacials and parafrontals, including juncture, obscured. Cheeks as high as width of antennal segment 3. Antennae fulvous, inserted near middle of eyes and ending opposite their lower margin; segment 3 is 2.5 times as long as 2. Arista slightly darker than segment 3; longest hairs on both surfaces, including aristal diameter, 0.9 as long as antennae. Palpi slender, brownish yellow, somewhat lighter than darkest part of mentum.

Thorax shiny fulvous, without traces of gray pruinescence or darker vittae. *Ac* 0:1; *dc* 2:4, second *postsut* pair about 0.75 as long as first pair, the former 0.80 as long as third, and 0.67 as long as fourth; *ia* 2, anterior one subequal to posterior *ntpl*; *pra* 0.4 to 0.6 as long as posterior *ntpl*, the latter 0.8 as long as anterior *ntpl* and with setulae adjacent to base of *ntpls*. Hypopleura and preepisternum III bare; pleuratergite below root of calyptrae with several dark, pilose hairs. Bristles, setulae, and hairs on other portions of pleura dark.

Legs fulvous, but very closely placed clothing setulae on tarsi make them appear darker than remainder of legs. *F1* without *av* bristles. *T1* with a strong apical *d* and a much weaker *pv*; median bristles absent. *F2* with *av* clothing setulae erect, but not in a distinct row; four to six slender *pv* bristles on basal 0.5 which are at least 0.5 as long as height of *F2* where situated, and blend into an indistinct row of much shorter apical setulae. *T2* with two median *p*. *F3* with five to seven *av* bristles on apical 0.5 which become longer and stronger towards apex; about six slender *pv* on median 0.50 to 0.66 which are about as long as height of *F3* where situated, and become slightly stronger towards apex (fig. 10, *g*). *T3* with one median *ad* and *av* bristle; apical *d, ad* and *av* all subequal to *T3* diameter. Pulvilli and claws each as large and long as tarsal segment 5.

Wings hyaline, faintly brownish yellow along anterior margin but not in form of a distinct costal cloud. Node and third vein slightly beyond, with one or two short hairs on ventral surface. Middle of posterior cross vein curved basally. Calyptrae brownish tinged, darker than wings; the margin of upper one slightly darker than its disc; halteres fulvous.

Abdomen fulvous, except fuscous apex of tergite 3, entire tergite 4, and hypopygium. Basal sternite with one or two hairs on each side.

Female: 5.6-6.0 mm. long. Similar in color to male. Front at vertex 0.30 of head width, broadened to 0.36 at base of antennae. Frontal vitta velvety black. Frontal triangle not sharply differentiated, not reaching beyond middle of front. Parafrontals with numerous short hairs between strong anterior, and several shorter, weaker ones behind; anterior bristle of the two posterolaterally directed pair about 0.5 as long as posterior bristle. Antennae inserted at or very slightly above middle of eyes. Palpi more yellowish and broader preapically than in male.

Preepisternum III with or without a few short, pale, pilose hairs. *Pv* series of *F2* and *av* on *F3* shorter; without clearly differentiated *F3 pv* bristles. Abdominal tergite 2 with a narrow apical dark band.

Holotype, male (US 67194), Moen, Truk, Civ. Ad. Area, Mar. 7, 1949, Potts; allotype, female (US), Truk, S. Valley, Mt. Tonaachau, Moen, Apr. 25, 1949, Potts; paratypes (BISHOP, US, CAS): two females, same locality as type, but Feb. 6 and Mar. 5, 1949; female, Dublon I., Truk Is., Caroline Islands, Dec. 22, 1935, Ono.

DISTRIBUTION: Caroline Is. (Truk).

The hypopleura, preepisternum III, and abdomen in the type are slightly greased so that fine pale hairs if present are not visible; it seems probable, however, that preepisternum III in males will possess one or two pilose hairs. One paratype (taken February 6, 1949) has three intraalars on left side, but the typical two bristles on right side.

The short second *postsut dc* bristle suggests that the specimens described above are only a variant of *apicalis,* especially since they occur in the same localities. However, the absence of hypopleura hairs below the spiracle, and absence of a narrow dark band on the second abdominal tergite of the male is sufficient to consider these specimens to represent a distinct species.

74. **Dichaetomyia yapensis** Snyder, new species.

Male: 5.3 mm. long. Head dull gray pruinescent; ground color brownish fuscous, except for lighter-colored region adjacent to oral margin, and reddish-brown cheeks. Parafrontals contiguous at middle of front; eyes at this level separated by a distance equal to diameter of anterior ocellus. With three or four pairs of parafrontal bristles anteriorly; and a pair of short reclinate hairs about 0.8 length of ocellar tubercle in front of anterior ocellus, and subequal to hairs on ocellar tubercle. In profile, para-

facials and parafrontals obscured, except at their juncture, which protrudes anteriorly no more than a distance equal to greatest aristal diameter. Antennae fulvous, inserted very slightly below middle of eyes and ending slightly above their lower margin. Segment 3 is 2.8 times as long as 2. Arista concolorous with antennal segment 3; longest hairs on both surfaces, together with aristal diameter, slightly longer than length of antennal segment 3. Palpi light brown, concolorous with mentum. Eyes bare.

Thorax fulvous, with very faint presutural grayish pruinescence on anterior 0.75 of median portion and a faint strip along planes of *presut dc* bristles. *Ac* 0:1; *dc* 2:4; *ia* 1, or if 2, the anterior one is scarcely stronger than adjacent clothing hairs; *pra* about 0.6 as long as posterior *ntpl*; latter 0.75 as long as anterior *ntpl*; with setulae adjacent to base of both *ntpls*, but these more numerous near posterior bristle. Scutellar setulae do not descend below level of marginals. Hypopleura with several pale hairs below spiracle, and some shorter ones on preepisternum III; other hairs, and bristles on pleura dark, including several on pleurotergite below lower calyptrae.

Legs mostly fulvous; except basal 0.75 of *F2* and most of *F3* which are fuscous brown, *T3* not quite so dark as *F3* and tarsi slightly darker than *F1*. *F1* without *av* bristles. *T1* with an apical *d* bristle only. *F2* without clearly defined *av* to *pv* bristles. *T2* with two median *p*. *F3* with four or five *av* bristles on apical 0.33 which become longer and stronger toward apex; and two short, or one long median *p* setulae. *T3* with a short median *ad* and *av* bristle.

Wings hyaline, somewhat yellowish along anterior margin, but not in the form of a costal cloud. Ventral surface of third vein with one or two hairs beyond node. Posterior cross vein curved. Calyptrae concolorous with thorax, margins not darkened; halteres fulvous, base of stalk somewhat yellowish.

Abdomen fulvous, with diffuse fuscous to fuscous-brown irregular bands on visible tergites 2 and 3. Tergite 4 with a diffuse dark median band and apex of tergite distinctly fulvous yellow. Hypopygium yellow. Sternites yellow. Basal sternite setulose; sternite 5 with a very broad U-shaped incision; processes and disc without distinctive armature.

Female: 4.3 mm. long. Very similar to male. Front at vertex 0.27 of head width, broadened to 0.34 at base of antennae, latter inserted slightly above middle of eyes. Thorax without pruinescence (but teneral condition and rubbing, as indicated by many broken-off clothing setulae, may indicate that its absence is not significant). *F2* not quite as extensively darkened as male, but this may be due to teneral condition also. Hind legs, except coxae and trochanters, fuscous.

Holotype, male (US 67195), Yap I., hill behind Yaptown, 50 m., Nov. 30, 1952, in light trap, Gressitt; allotype, female (US), Yaptown, Mt. Matade, July 12, 1946, Townes.

DISTRIBUTION: Caroline Is. (Yap).

75. Dichaetomyia saperoi Bohart and Gressitt (fig. 2, *d*).

Dichaetomyia saperoi Bohart and Gressitt, 1946, Ent. Soc. Am., Ann. **39**: 418; 1951, B. P. Bishop Mus., Bull. **204**: 108.

Head: fuscous, gray pruinescent; occasionally fulvous to brown in ground color adjacent to vibrissal angle. Antennae fulvous; segment 3 often with a dorsal apical shadow, especially in females. Arista fulvous brown, long plumose. Palpi dark brown to fuscous. Front in male at narrowest part narrower than diameter of anterior ocellus; parafrontals with a pair of strong anterior bristles and three to six shorter bristly hairs behind which do not extend posteriorly beyond contiguous portion of parafrontals, and a very short hair just anterior to ocellar tubercle. Female front at vertex 0.25 of head width, gradually broadened to 0.30 at base of antennae. Anterior parafrontal bristle stronger than anterior ocellars, and with numerous short hairs laterad to convergent series of short parafrontal bristles.

Thorax yellow to fulvous yellow; with scarcely visible whitish pruinescence. *Dc* 2:4, anterior two *postsut* pairs almost as long as posterior two pairs; prescutellar *ac* present, *ac* setulae in 7 to 10 irregular rows; *ia* 2; *pra* slightly shorter than posterior *ntpl* bristle, latter usually shorter than anterior *ntpl*; *ntpl* hairs most numerous adjacent to posterior bristle. Infrasquamal hairs sparse, short, and dark. Scutellar setulae descend scarcely below level of marginal bristles. *St* 1:2.

Legs mostly yellow; tarsi fuscous, tibiae become darker from mid to hind pair and *T3* often blackish. *F3* without *av* bristles. *F3* in male with three to six median *pv* bristles which are subequal to height of *F3* where situated; absent or extremely short in female, *av* bristles confined to apical 0.5 to 0.3 in both sexes. *T3* with one median *ad* and *av* bristle.

Wings tinged with light yellow, often slightly darker adjacent to second vein, but without clouds. Calyptrae slightly darker than wings, margins of upper one usually dark brown to fuscous.

Visible abdominal tergite 3 subshiny black to fuscous; 4 yellowish apically, blending to fuscous basally; 1 and 2 variable but usually blending from fulvous at base of 1 to fuscous on apical 0.5 or more of 2.

DISTRIBUTION: S. Mariana Is.

S. MARIANA IS. 13. AGIGUAN: "Owen's Oasis," Nov. 1955, at light, Davis. GUAM: Barrigada, Aug. 1936, on corn tassels, Swezey; Ritidian, Nov., Dec., Jan. 1945, 1946, human feces, Gressitt; Pt. Ritidian, Aug. 1945, Bohart and Gressitt; Oct. 1952, Krauss; Tijan, Feb. 1936, ex mango, Bryan; Pt. Oca, June 1945, light trap, Gressitt.

Genus **Stomoxys** Geoffroy

Stomoxys Geoffroy, 1764, Hist. Ins. **2**: 538.—Malloch, 1928, Ann. Mag. Nat. Hist. X, **2**: 317; 1932, ibid. X, **9**: 381.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 115.

Proboscis very long, subshiny, and adapted for blood sucking; palpi slender, not longer than antennae (fig. 26, *b*). Eyes strongly emarginate posteriorly. Arista pectinate. *Dc* very short, only posterior *postsut* pair well defined. Pteropleura, prosternum, and beret setose; propleura with a few short hairs. Hypopleura and preepisternum III bare. *St* 0: 1. Fourth wing vein distinctly curved forward, ending slightly behind wing tip. Lower calyptrae rounded apically, but inner margin reaches almost to end of bare suprasquamal ridge. Third wing vein setulose on node and beyond on both surfaces.

76. **Stomoxys calcitrans** (Linnaeus). (Figure 26, *b*.)

Conops calcitrans Linnaeus, 1758, Syst. Nat., ed. **10**: 604.

Stomoxys calcitrans, Fabricius, 1775, Syst. Ent., 798.—Malloch, 1932, Ann. Mag. Nat. Hist. X, **9**: 402.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 115.

Front at vertex in male 0.40 to 0.50 as long as frontal length at middle; and at least 0.66 in female. Palpi yellow. Thorax dark, gray to yellowish gray pruinescent; two pairs of subcontiguous brown vittae overlay a pair of darker ones. Legs fuscous except yellowish to fulvous base of tibiae.

Fore tarsi in both sexes without upstanding, long anterior hairs. *F3* of male with *av* clothing setulae on basal 0.75 upright, and of almost uniform length, but less than 0.33 height of *F3*.

Wings hyaline, first vein bare with only a few minute hairs on ventral surface opposite humeral cross vein. Setulae on third vein extend less than 0.5 distance to anterior cross vein. Calyptrae whitish.

DISTRIBUTION: Cosmopolitan; Bonin Is., Mariana Is., Caroline Is.

BONIN IS. CHICHI JIMA: 16, Omura, Okumura, Apr., May, June 1958, Snyder.

N. MARIANA IS. PAGAN: Two, Songsong, Apr. 1940, Yasumatsu and Yoshimura.

S. MARIANA IS. 21. GUAM: 1911, Fullaway; Yigo, Mar., Oct. 1957, 1958, Krauss, Snyder; Pt. Oca, May 1945, Gressitt; Agana, July 1945, rotting plants, spring muck, Bohart and Gressitt; Fadian (Fadang), June 1954, Dybas; Pago Bay, June 1945, Dybas.

PALAU. Seven. BABELTHUAP: Ulimang, Dec. 1947, Dybas; Ngiwal, Sept. 1951, Gressitt. KOROR: Jan., July, Nov. 1947, 1953, 1954, Dybas, Beardsley; S.W. part, 25 m., light trap, Dec. 1952, Gressitt.

PONAPE. Five, Colonia, Jan., June-Sept. 1938, 1950, Kuya, Adams; Lehdau, Reitao-Oua-U, July 1939, Esaki.

Adults of *S. calcitrans* commonly prefer cattle and horses for their blood meal, but will readily feed on man, dog, other domestic mammals, and occasionally on birds if no other blood source is available. Larvae develop most commonly in the outer layers of large accumulations of animal feces, or decaying vegetable material. It is frequently a pest on beaches in the southeastern United States where it breeds most frequently in masses of rotten sea weed, or kelp. A cosmopolitan species, it is probably absent on isolated islands where man and large animals are not indigenous.

Bohart and Gressitt (1951) summarize its habits on Guam and review the literature. Bezzi and Stein (1907, Kat. Paläarkt Dipt. **3**: 611), Stein (1919, Archiv Naturgesch. A, 82, **1**: 102), and Bohart and Gressitt (1951) have noted between them 20 synonyms of this species, described from the Holarctic, Neotropical, and Ethiopian regions, while Zumpt (1950, Inst. Med. Trop., Ana. **7**: 416-417) lists 26 synonyms in a preliminary study to a monograph of the Stomoxydinae. Since none of these names have been associated with Micronesian species there appears to be little point in relisting them at this time.

The next two genera belong in Malloch's concept (1932, Ann. Mag. Nat. Hist. X, **9**: 433) of a tribe Haematobini of a subfamily Stomoxydinae. Considerable confusion exists as to the proper name to apply to each genus, since various authors have used *Haematobia, Lyperosia,* and *Siphona* for both. Much of this ambiguity is the result of different interpretations of the rules of nomenclature, and is essentially a question of whether the original generic description is considered paramount, or whether existing specimens of cited types of gen-

era, based on correctly or incorrectly identified species and/or specimens, are given primary consideration.

The names used by Malloch for these two genera are employed in this paper and the nomenclatural problems are left for those more qualified or interested.

Genus **Haematobia** Lepeletier and Serville

Haematobia Lepeletier and Serville, 1828, Encyl. Meth. **10** (2) : 499.—Townsend, 1937, Manual of Myology **5**: 21.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 117.

Priophora Robineau-Desvoidy, 1863, Hist. Nat. Dipt. **2**: 611.

Lyperosia of authors; see Bezzi and Stein, 1907, Kat. Paläarkt. Dipt. **3**: 612 (*nec* Rondani 1856).

Haematobia (*Haematobia*), Malloch, 1932, Ann. Mag. Nat. Hist. X, **9**: 502.

Siphona of authors (recent U. S. economic literature) *nec* Meigen, 1803.

Type species: *Conops irritans* Linnaeus.

Proboscis very long and adapted for blood sucking. Palpi subequal to length of mentum, distinctly broader on apical 0.5 than at base. Arista bare on ventral surface (fig. 26, *a*). Posterior margin of eyes not emarginate. Front narrow in male, broad in female. Propleura, hypopleura, beret, and preepisternum III bare. Prosternum laterally, pteropleura dorsally with some pale hairs. Only anterior *st* bristle distinguishable as a yellow hair. Hairs on pleura gray to golden and usual bristles represented by long, slender hairs. Third and fourth wing veins strongly convergent, fourth ending in, or very slightly behind, wing tip. Sixth vein gradually thinner apically and continued more than 0.25 distance from its point of origin to anal margin. All veins, except costa, bare. Lower calyptrae rounded apically, inner apical margin terminating before end of bare suprasquamal ridge.

77. Haematobia exigua de Meijere (fig. 26, *a*).

Haematobia exigua de Meijere, 1903, IN P. Schat, Veredere Meded. over Surra. Meded. Proefst. Oost-Java **3** (44) ; 1904, Natura Artis. Mag. Amsterdam Bijdraged Dierkunde **18**: 104.—Malloch, 1932, Ann. Mag. Nat. Hist. X, **9**: 505.—Mackerras, 1933, Ann. Mag. Nat. Hist. X, **11**: 60.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 117.

Haematobia flavohirta Brunetti, 1910, Indian Mus., Rec. **4**: 89.—Mackerras, 1933, Ann. Mag. Nat. Hist. X, **11**: 61.

Haematobia australis Malloch, 1932, Ann. Mag. Nat. Hist. X, **9**: 506.—Mackerras, 1933, Ann. Mag. Nat. Hist. X, **11**: 61.

Head dark to silvery gray pruinescent. With 8 to 10 pairs of convergent, pale, slender parafrontal bristles. Antennal segments 1 and 2 fulvous; 3 variable, base usually fulvous, remainder fuscous. Palpi fulvous brown, usually lighter colored at base, especially in females.

Thorax fuscous, gray pruinescent; a dark, irregular vitta between *dc* and *ia* planes, and an irregular pale-brown prescutellar spot.

Leg color variable; knees fulvous, femora and tibiae brown to fulvous and usually more extensively fulvous in females than in males. *F3* with a slender basal *v* bristle.

Basal three hind tarsal segments in males expanded and bear longish *a* and *p* hairs; not modified in females.

Wings and calyptrae hyaline; margins of lower calyptrae slightly darkened, especially in males.

Abdomen fuscous; brownish gray pruinescent and with a dark median vitta. Dorsum with numerous short, upright pale to dark setulae.

DISTRIBUTION: Australia, India, Philippines, East Indies, S. Mariana Is., Caroline Is.

S. MARIANA IS. 42. TINIAN: Mar. 1954, Dybas; ridge 1 mi. n. of Tinian Harbor, Mar. 1945, Dybas. GUAM: Yigo, Mar. 1958, on cow, Snyder; Barrigada, Mar. 1958, on horse, Snyder; Pt. Oca, May 1945, Bohart and Gressitt, Dybas; Asan, July 1945, Bohart and Gressitt; Pago Bay, May 1945, Gressitt; S.E. coast, May 1945, carabao hole, Bohart and Gressitt; Umatac, Mar. 1958, on carabao, Snyder.

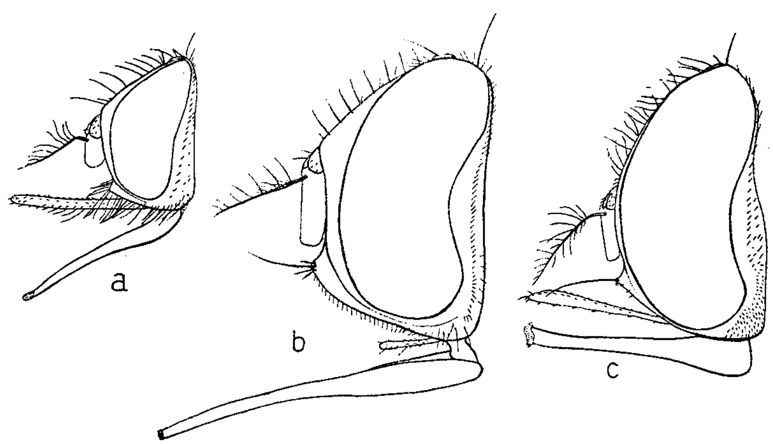


FIGURE 26.—Male head profiles: **a**, *Haematobia exigua*; **b**, *Stomoxys calcitrans*; **c**, *Bdellolarynx carabao*.

PALAU. 91. KOROR: Nov. 1947, Dybas; on bull, Apr. 1957, Sabrosky. BABELTHUAP: Ngerehelong, May 1957, on cow, Sabrosky.

YAP. YAP: 26, Kolonia, July, Aug. 1950, Goss; south-central part, July, Aug. 1950, Goss.

PONAPE. Colonia, one, July 1949, on bull, Owen.

It is difficult to separate Micronesian specimens of this species from North American specimens of the holarctic horn fly, *H. irritans* (Linnaeus). The most reliable character appears to be the fewer pairs (8 to 10) of convergent parafrontal bristles in both sexes of Micronesian specimens, compared to the more numerous hairs (11 to 13) in Nearctic specimens of *irritans*. The margins of the lower calyptrae are somewhat darker in *irritans* than in *exigua*.

Malloch (1932, loc. cit.) and Mackerras (1933, loc. cit.) have placed particular emphasis on the bristling of the male hind tarsi to separate the two species, a character which is not constant in the Micronesian material.

Rearing and crossing experiments, as suggested by Mackerras, will probably be necessary before the status of Australian, Oriental, Holarctic, and probably Micronesian populations can be defined.

Genus **Bdellolarynx** Austen

Siphona of authors; see Bezzi, 1907, Rend. Ins. Lombardi II, **60**: 17.—Bohart and Gressitt, 1946, Ent. Soc. Am., Ann. **39**: 422; 1951, B. P. Bishop Mus., Bull. **204**: 118 (*nec* Meigen, 1803).

Haematobia Robineau-Desvoidy, 1830, Hist. Nat. Dipt. **2**: 338, *nec Haematobia* Lepeletier and Serville, 1828, Encycl. Meth. **10** (2): 499.

Lyperosia of authors; see Bezzi, 1907, Rend. Ins. Lombardi II, **60**: 17 (*nec* Rondani 1858).

Bdellolarynx Austen, 1909, Ann. Mag. Nat. Hist. VIII, **3**: 290.—Malloch, 1932, Ann. Mag. Nat. Hist. X, **9**: 434.—Townsend, 1937, Manual of Myology **5**: 21.

Lyperosiopsis Townsend, 1912, Ent. Soc. Washington, Proc. **14**: 47.

Type species: *B. sanguinolentus* Austen.

Proboscis long, adapted for blood sucking. Palpi subequal to length of mentum; grooved along inner side and distinctly dilated on apical 0.3 to 0.5. Arista with long hairs on both surfaces, but those on upper more numerous than those below (fig. 26, *c*). Prosternum setulose on sides; propleura, and all portions of hypopleura bare; pteropleura setulose. All wing veins, except costa, bare. Fourth vein gradually and gently curved forward, ending slightly behind wing tip. Apex of lower calypter rounded, its inner margin joining bare suprasquamal ridge before (anterior to) posterior termination of latter. *T2* and *T3* without even short median bristles.

78. Bdellolarynx carabao (Bohart and Gressitt). (Figure 26, *c*.)

Siphona carabao Bohart and Gressitt, 1946, Ent. Soc. Am., Ann. **39**: 422; 1951, B. P. Bishop Mus., Bull. **204**: 118.

Palpi yellow to fulvous, sometimes apex slightly brown. Remainder of head fuscous gray to brownish gray pruinescent. Eyes slightly emarginate below middle on posterior margin. Thorax dark, grayish to brownish pruinescent with four incomplete brown vittae and a short median prescutellar stripe. Supraalars 1; postalars 2; *ia* 1; only posterior two *postsut* pairs of *dc* clearly differentiated; *presut ac* in 10 to 12 irregular rows; prescutellar *ac* bristles strong; *st* 1:1; prosternum setulose on sides.

Apices of femora and all of *T1* yellow to fulvous, tarsi fulvous brown, remainder of legs fuscous. All tibiae lack median bristles. *F3* without a preapical *av* bristle.

DISTRIBUTION: Bonin Is., S. Mariana Is., Caroline Is.

BONIN IS. CHICHI JIMA: 45, Okumura, Apr. 1958, on cow, Snyder.

S. MARIANA IS. 77. SAIPAN: July 1944, on cow. GUAM: Yigo, Mar. 1958, on cow, Snyder; Asan, July 1945, Bohart and Gressitt; Ylig, Mar. 1958, sweeping in pasture, Snyder; Ipachol, July 1945, Bohart and Gressitt; Umatac, Mar. 1958, on carabao, Snyder; near Merizo, July 1945, Bohart and Gressitt; Ulomnia, May 1945, Bohart and Gressitt; Port Ajayan, June 1945, Dybas.

YAP. YAP: One, Kolonia, July, Aug. 1950, Goss.

Larvae breed in manure of cattle and carabao. Bohart and Gressitt (1951) discuss its life history and illustrate egg, larvae, and pupae.

The specimen from Yap has the tarsi black, and the tibiae yellowish brown. Since Bohart and Gressitt (1946) mention a color variant from Guam which has wings and calyptrae yellow, and the body with golden sheen, I hesitate to consider the Yap specimen as representing a distinct geographical subspecies, without additional material from that group. This species would be placed in the typical subgenus if Malloch's subgeneric divisions are used.

Genus **Synthesiomyia** Brauer and Bergenstamm

? *Hyadesimyia* Bigot, 1888, Miss. Cape Horn, Zool., Dipt. **6**: 26.

Synthesiomyia Brauer and Bergenstamm, 1893, Akad. Wiss. Wien, Denkschr. **40**: 96.

Type species: *S. nudiseta* Van der Wulp.

Arista bare; antennae mostly red. Posterior 0.3 to 0.4 of frontal vitta in both sexes with numerous short, but distinct, hairs. Propleura and pteropleura bare; prosternum densely setose. Hypopleura below spiracle and preepisternum III haired; beret usually bare. Operculum of posterior thoracic spiracle large, long-haired. *St* 1 : 2; suprasquamal ridge bare. Fourth wing vein strongly curved forward and enters costa before wing tip (fig. 3, *g*). Lower calyptrae subtruncate apically, its inner margin broadly contiguous along its entire length to the bare suprasquamal ridge.

79. Synthesiomyia nudiseta (Van der Wulp). (Figure 3, *g*.)

Cyrtoneurina nudiseta Van der Wulp, 1883, Tijdschr. Ent. **26**: 42.

Hyadesimyia grisea Giglio-Tos, 1893, Mus. Torino, Bull. **7**: 5.

Synthesiomyia brasiliana Brauer and Bergenstamm, 1893, Akad. Wiss. Wien, Denkschr. **40**: 96, 110.

Gymnostylina schmitzi Becker, 1908, Zool. Mus. Berlin, Mitt. **4**: 196.

Synthesiomyia nudiseta, Bezzi, 1911, Soc. Ent. Ital. Prodr. **24**: 65.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 123.

Antennae mostly reddish to fulvous, apical dorsal margin of segment 3 often with a variable darkened streak. Palpi fulvous. Front at narrowest part 0.18 to 0.22 of head width in male, and about 0.50 in female. Thorax dark, grayish pruinescent; broadly quadrivittate; a variable apical portion of scutellum reddish to brown. Femora and tibiae vary from fulvous to brownish fuscous. Wing veins, except costa, bare. Outer margin of upper calyptrae darker than disc, especially in male; lower calyptrae vary from white to light brown, but these are usually darker in male than female. Abdomen mostly dark; grayish to silvery pruinescent, and with lateral checkering. Apex or more of abdominal segment 4 yellow to fulvous.

DISTRIBUTION: Arkansas to North Carolina and south to Southern Argentina and Chile; South Africa, Madeira, Australia, Pacific Islands, Bonin Is., S. Mariana Is.

BONIN IS. CHICHI JIMA: One, Omura, May-June 1958, Snyder.

S. MARIANA IS. GUAM: Three, Agana, Pt. Oca, May 1945, Bohart and Gressitt.

The specimen from Chichi Jima was taken in the late afternoon in the rain on a rotting log on the ground. The labels on the specimens from Guam indicate that they were taken in a mess hall and on dead mollusks. Bohart and Gressitt (1951) have summarized the published breeding habits of this species which indicate that larvae develop in carrion, though they note that Buxton reared them from human feces. I observed adults on carrion only during late afternoon and early evening during the warmest dry months in Orlando, Florida.

It is possible that *nudiseta* is more abundant and widely distributed in Micronesia than the four specimens in the collection indicate, especially since it has been recorded from such distant spots as Australia, Samoa, and Hawaii. The relatively long immature stages might be advantageous in permitting it to be transported for long distances by relatively slow ocean vessels.

Bohart and Gressitt note that the species on Guam "though not common . . . was fairly abundant during May," and was "not seen at all in Sept." They also note that "the only specimens we saw at large were on the summit of Mt. Tenjo where they were landing and mating on a wooden tower."

Genus **Graphomya** Robineau-Desvoidy

Graphomya Robineau-Desvoidy, 1830, Acad. Roy. Soc. Sci. France, Mem. II, **2**: 403.—Hennig, 1958, IN Lindner, Flieg. Palaearct. Reg., Lief. 199, Muscidae **63**, b: 231; 1959, ibid., Lief. 204: 233.

Curtoneura Macquart, 1833, Recueil Soc. Sci. Lilli, 146.

Cyrtoneura Meigen, 1838, Syst. Beschr. **7**: 309.

Type species: *G. maculata* Scopoli.

Face with a distinct, broad carina between antennae. Arista long-haired. Thorax without prosternal, propleural, or pteropleural hairs; hypopleura haired below and in front of spiracle. Fourth wing vein strongly curved forward and ending in wing tip; forward curve rounded, not angulate (fig. 3, *h*). Third wing vein hairy on dorsal and ventral surface beyond node. Lower calyptrae with apical margin transverse or truncate as in figure 1, *g*.

Thoracic dorsum with dense silvery-gray pruinescence which is interrupted by five to seven sharply defined black to dark-brown stripes or vittae of variable length and width. Flies 6-9 mm. long.

Few satisfactory structural characters have been found to distinguish the numerous described species or "forms" of *Graphomyia*. Earlier authors have placed considerable emphasis on such characters as *T3* and abdomen colors which are quite variable when long series of specimens throughout the range of a species are studied. The two species from Micronesia are quite similar in this regard, but are quite distinct on the basis of the characters used on the

following couplet. Van Emden (personal communication of January 24, 1957) considered *rufitibia* to be a subspecies of the widely distributed Neotropical *Graphomyia stipata* Walker (1856, Dipt. Saund., 348).

Adult females of *Graphomyia* are abundant around feces or garbage in shady, swampy environments; and males, while often hovering near females, can usually be found more abundantly on adjacent blossoms or leaves of legumes and umbelliferous plants.

Micronesian species of *Graphomyia* may be distinguished as follows:

G. stipata rufitibia	G. maculata
Males: Thorax, viewed from above and behind, with a narrow median vitta extending from scutellum only to transverse suture or very slightly beyond and well separated from the two narrow presutural *dc* vittae; lower calyptrae whitish with slight yellow to pale brownish tinge. At narrowest part of front, each parafrontal as wide as frontal vitta.	Males: Thorax, viewed from above and behind, with median dark vitta continued almost to anterior margin and confluent or subconfluent with broad *dc* vitta; lower calyptrae dark brown. At narrowest part of front, each parafrontal narrower than frontal vittae.
Females: Prescutellar pair of *ac* bristles inserted slightly outside of narrow, relatively short median dark vitta. Eyes almost, or completely bare.	Females: Prescutellar pair of *ac* bristles inserted well within, or slightly inside relatively long and broad median dark vitta. Eyes with numerous short hairs.

80. Graphomya maculata (Scopoli).

Musca maculata Scopoli, 1763, Ent. Carn., 327.

Musca vulpina Fabricius, 1781, Species Insectorum 2: 439.

Graphomya minor Robineau-Desvoidy, 1830, Acad. Roy. Soc. Sci. France, Mem. II, 2: 403.

Graphomya maculata, Robineau-Desvoidy, ibid.

Male: Head black; pruinescence on parafacials and parafrontals gray with distinct yellowish reflections. Each parafrontal (area between eyes and row of strong bristles) at narrowest part not so wide as velvety-brown to black frontal vitta. A single row of parafrontal hairs interspersed between strong bristles and with numerous, dense rows of hairs on vitta. Antennae and palpi entirely black. Eyes densely long-haired.

Thorax black; viewed from above and behind with a broad median black vitta from anterior margin to base of scutellum where it joins a large, dark, dorsal, triangular scutellar mark; in certain dorsal angles median vitta is formed by a pair of presutural vittae and a median linear one, all of which are subconfluent presuturally or separated by a very faint, grayish-brown pruinescent streak along inner side of each presutural *dc* vitta; a broad black vitta between *dc* and *ia* planes on each side and a narrow postsutural dark streak in *pra* and *sa* planes. Prescutellar *ac* bristles situated well inside of median vitta. *St* 0: 2.

Legs black, tibiae brown to reddish, becoming fuscous apically. *T1* with apical *d* and *pv* bristles as long as *T1* diameter. *V* bristles on basal half of *F2* slightly longer than height of *F2* where situated. *T2* with one or two submedian *p* bristles. *F3* with a complete row of long *av* bristles, long *v* to *pv* on basal 0.5 longer than *F3* diameter.

Wings hyaline. Calyptrae brown, the margin of upper ones often very deep brown. Abdomen as in *stipata rufitibia.*

Female: Similar to female of *stipata rufitibia,* but parafrontals with yellow to brownish reflections on that part laterad to middle of parafrontal series of bristles and with three to six irregular rows of dense hairs laterad and mesad. Very short hairs on eye usually sparse or absent.

Area between presutural dark vittae brownish gray and prescutellar *ac* pair of bristles situated well inside of dark median prescutellar vitta.

Legs as in male, but those setae and hairs on *v* surface of *F2* and *F3* shorter than femoral height where situated.

Abdomen as in *stipata rufitibia.*

DISTRIBUTION: Holarctic, Ethiopian, Neotropical, Oriental Regions; Bonin Is.

BONIN IS. 110. CHICHI JIMA: Chihiro-iwa, Tatsumi Wan, Sakai-ura, Yoake Yama, Okumura, Ogiura, Miyanohama, Minato-ko, Apr., May 1958, Snyder; Omura, Apr., May, June 1958, Snyder. ANI· JIMA: Commanders Beach, Apr. 1958, Snyder. HAHA JIMA: July 1951, R. Bohart; Okumura, Apr., May 1958, Snyder.

81. Graphomya stipata rufitibia Stein. (Figure 3, *h.*)

Graphomya rufitibia Stein, 1918, Mus. Nat. Hungarici, Ann. **16**: 147; 1919, Nova Guinea, Zool. **13**: 200.—Mackerras, 1932, Linn. Soc. New South Wales, Proc. **57**: 361.—Hennig, 1959, IN Lindner, Flieg. Palaearkt. Reg., Lief. 204, Muscidae **63**, b: 237.

Graphomyia maculata rufitibia, Hardy, 1936, Roy. Soc. Queensland, Proc. **48**: 7.

Graphomyia stipata rufitibia, van Emden, Fauna of India, in press.

Male: Head dark, silvery gray pruinescent. Narrow frontal vitta velvety black, and at narrowest part not quite as broad as one parafrontal at this level; a single irregular row of hairs laterad to, or interspersed with, parafrontal bristles; without hairs on vitta mesad to parafrontal bristles. Root of antennal segment 3 reddish, remainder of antennae and palpi fuscous. Eyes hairy.

Thorax black, gray pruinescent and with following sharply delineated black to fuscous stripes: two median ones from anterior margin to opposite second of four postsutural *dc,* and these vittae as wide as median presutural gray area; postsuturally with a narrow vitta which becomes broader and joins a broad triangular dorsal spot on scutellum; a long vitta between *dc* and *ia* planes both presuturally and postsuturally and are subconfluent with a narrow streak at transverse suture in *pra* and *sa* plane. Prescutellar pair of *ac* bristles inserted at, or slightly outside of, margin of dark median postsutural vitta. Scutellum with a small, dark spot on each side at base. *St* 0: 2.

Legs fuscous, tibiae reddish, becoming brownish apically. *T1* without median bristles; apical *d* and *pd* subequal, and slightly longer than *T1* diameter. *F2* with *v* bristles on basal 0.5 as long as or slightly shorter than *F2* height where situated. *T2* with one or two submedian *p* bristles. *F3* with a few *v* to *av* setulae on basal 0.25 to 0.40 which are not longer than *F3* height where situated; and a complete row of *av* which become slightly longer and stronger toward apex.

Wings hyaline. Upper and lower calyptrae white with very faint brownish yellow tinge; halteres yellow.

Abdomen yellowish brown with dense silvery-gray pruinescence. Tergites 1 to 3 with expansive subquadrate to subtriangular spots on each side of a narrow, interrupted median vitta; 2 and 3 with a small, brown, lateral apical spot. Viewed from side, with variable reflections. Tergite 4 with a pair of small, brown, median spots.

Female: Generally similar to male. Pruinescence silvery. Frontal vitta with triangle complete, narrow, silvery and, at most, angles of observation clearly defined, but when viewed from above and behind it is obscured and vitta appears entirely velvety black. Parafrontals with two or three sparse series of hairs laterad to parafrontal row of bristles; and mesad with one or two series of closely placed hairs which are inserted on, or slightly over, inner margin of silvery pruinescent portion of parafrontals. Eyes bare or with hairs visible only under high magnification.

Thorax as in male, but median postsutural vitta does not extend to suture, and prescutellar *ac* pair of bristles situated outside of median vitta.

Legs with tibiae more brown than reddish. Basal 0.25 to 0.40 of *av* and *v* to *pv* surfaces of *F3* with hairs much shorter than femoral height.

Calyptrae white.

Abdomen black to fuscous, silvery gray pruinescent, spotted as in male.

DISTRIBUTION: Sumatra, Java, New Guinea, Australia, India, Caroline Is.

PALAU. Four. BABELTHUAP: Airai, Ngarsung, May 1957, Sabrosky. KOROR: Feb., July, Sept. 1953, Beardsley.

Several years ago in attempting to identify some of the above specimens I asked the late Dr. van Emden to compare them with the type of *Musca stipata* Walker (1856, Dipt. Saund., 348), some specimens from Turbo, Columbia, and specimens of *rufitibia* from India. After making the requested comparisons, he concluded (personal communication) that *rufitibia* was a subspecies of *stipata*. When his posthumous paper on the Muscidae of India is published it is probable that his conclusions will be further elucidated.

Genus **Musca** Linnaeus

Musca Linnaeus, 1758, Syst. Nat., ed. 10, 589; 1761, Fauna Suec., ed. 2, 439. —Bezzi and Stein, 1904, Kat. Paläarkt. Dipt. **3**: 602.—Stein, 1919, Archiv Naturgescht. A, **82** (1): 103 (1917).—Malloch, 1925, Ann. Mag. Nat. Hist. IX, **15**: 135; 1929, ibid, X, **3**: 264.—Patton, 1932, Trop. Med. Parasit., Ann. **26**: 347; 1933, ibid, **27**: 327; 1937, ibid, **31**: 195.—Seguy, 1937, IN Wytsman's Gen. Insectorum **205**: 409.—van Emden, 1939, Ruwenzori Exped. 2 (3): 73.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 119.—West, 1951, The Housefly, 130.—Caberra and Rozeboom, 1957, Philippine Jour. Sci. **85**: 427.

Fourth wing vein abruptly bent forward near middle of its apical section, entering costa on fore margin before wing tip (fig. 27, *h*). Proboscis short, labella prominent; arista long-haired on dorsal and ventral surfaces; pteropleura, and prosternum setulose. Lower calyptrae truncate apically, their inner margins broadly joined to basal portion of scutellum. Posterior margin of eyes rounded or perpendicular, never emarginate.

KEY TO SUBGENERA AND SPECIES OF MICRONESIAN MUSCA (s. lat.)

1. Propleura hairy; males: at narrowest part of front, eyes separated by at least distance across posterior ocelli inclusive (fig. 27, *d*).. ....82. **Musca (Musca) domestica**
   Propleura bare; males: at narrowest part of front, eyes separated by less than distance across posterior ocelli inclusive (fig. 27, *e, f*)..2
2. Thorax with two broad, dark vittae postsuturally; tympanic pit bare;.............. ....83. **Musca (Byomya) sorbens**
   Thorax with four postsutural vittae; tympanic pit with several long setae (fig. 1, *g*)....................84. **Musca (Emusca) hervei**

Subgenus **Musca** Linnaeus (s. str.)

Musca Linnaeus, 1758, Syst. Nat., ed. 10, 589 (type, *M. domestica* Linnaeus by suspension of rules of nomenclature. Opinion number 82, 1925, Int. Comm. Zool. Nomen., Smithsonian Misc. Coll. 73 (3) : 1-7).

Eumusca Townsend, 1911, Ent. Soc. Washington, Proc. **13** : 170; 1931, Ann. Mag. Nat. Hist. X, **8** : 369 (type, *corvina* Fabricius = *domestica* Linnaeus; nec *corvina* authors = *autumnalis* de Geer).

Promusca Townsend, 1916, Washington Acad. Sci., Jour. **5** : 434 (type, *domestica* Linnaeus).

Propleura hairy (fig. 1, *f*); all parts of suprasquamal ridge and tympanic pit bare.

82. **Musca (Musca) domestica** Linnaeus (figs. 1, *f*; 27, *d*).
Musca domestica Linnaeus, 1758, Syst. Natur., ed. 10, 596.
Musca corvina Fabricius, 1781, Species Insectorum **2** : 440.
Musca nebulo Fabricius, 1794, Ent. Syst. **4** : 321.
? *Musca campestris* Robineau-Desvoidy, 1830, Acad. Roy. Soc. Sci. France, Mem., 395 (sp. no. 1).
? *Musca aurifacies* Robineau-Desvoidy, 1830, ibid., 396 (sp. no. 2).
? *Musca stomoxydea* Robineau-Desvoidy, 1830, ibid., 396 (sp. no. 3).
? *Musca riparia* Robineau-Desvoidy, 1830, ibid., 398 (sp. no. 8).
Musca bovina Robineau-Desvoidy, 1830, ibid., 398 (sp. no. 9).
Musca vagatoria Robineau-Desvoidy, 1830, ibid., 399 (sp. no. 12).
? *Musca hottentota* Robineau-Desvoidy, 1830, ibid., 399 (sp. no. 13).
? *Musca pellucens* Meigen, 1838, Syst. Beschreib. **7** : 303.
Musca harpyia Harris, 1842, Treat. Ins. New England, 413; 1869, Boston Soc. Nat. Hist., Occ. Papers **1** : 335.
? *Musca senegalensis* Macquart, 1843, Dipt. Exot. II, **3** : 151.
? *Musca australis* Macquart, 1843, ibid., 152.
? *Musca basilaris* Macquart, 1843, ibid., 153 (sp. no. 8).
? *Musca chilensis* Macquart, 1843, ibid., 153 (sp. no. 9).
? *Musca antiquissima* Walker, 1849, List. Dipt. Ins. Brit. Mus. **4** : 901.
? *Musca calleva* Walker, 1849, ibid., 905.

? *Musca sanctae-helenae* Macquart, 1850, Dipt. Exot., Suppl. **3**: 58 (sp. no. 14).

? *Musca minor* Macquart, 1850, ibid. **4**: 253 (sp. no. 18).

Musca vicina Macquart, 1850, ibid., 253 (sp. no. 19).

Musca vicaria Walker, 1860, Linn. Soc. London, Proc. **3**: 130.

? *Musca vaccina* Robineau-Desvoidy, 1863, Hist. Nat. Dipt. **2**: 625 (sp. no. 10).

? *Musca campicola* Robineau-Desvoidy, 1863, ibid., 627 (sp. no. 12).

? *Musca rivularis* Robineau-Desvoidy, 1863, ibid., 627 (sp. no. 13).

? *Musca frontalis* Rondani, 1868, Atti. Soc. Ital. Milano **11**: 51.

Musca niveisquama Thomson, 1868, K. Sven. Freg. Eugenies Resa, Dipt., 175.—Stein, 1919, Archiv Naturgesch. (1917), 82 A, **1**: 104.

? *Musca flavinervis* Thomson, 1868, K. Sven. Freg. Eugenies Resa, Dipt., 547 (sp. no. 178).

? *Musca flavipennis* Bigot, 1887, Soc. Ent. France, Bull. **12**: 605.

? *Musca flavifacies* Bigot, 1887, ibid., 606.

? *Musca pampaisina* Bigot, 1887, ibid., 607.

? *Musca atrifrons* Bigot, 1887, ibid., 607.

Musca multispina Awati, 1917, Indian Jour. Med. Res. **5**: 160.

Musca divaricata Awati, 1920, ibid. **7**: 548.

Musca determinata Walker, of Patton, 1937, Trop. Med. Parasit., Ann. **31**: 128.

Thorax black, grayish pruinescent, with four broad, subshiny vittae; inner (mesal) ones widely separated from each other in *ac* plane by a gray pruinescent area, and outer (lateral) and inner ones narrowly separated from each other in *dc* plane.

Presut dc 2; postsutural number variable, though usually four, posterior two pairs sometimes stronger than anterior two, though much variation is frequent.

Abdomen in male usually more yellow on sides basally than in female, but various color forms occur.

DISTRIBUTION: Cosmopolitan.

BONIN IS. 27. 1929-1935, Oaido. CHICHI JIMA: Omura, Okumura, Sakai-ura, Futami-ko, Apr., May 1956-1958, Clagg, Snyder. ANI JIMA: Southwest Bay, June 1958, Snyder.

VOLCANO IS. IWO JIMA: 14, June 1958, Snyder.

N. MARIANA IS. PAGAN: Two, Aug. 1954, Corwin.

S. MARIANA IS. 26. SAIPAN: Feb. 1945, Ducoff; Garapan, Mar., May 1940, Yasumatsu and Yoshimura. AGIGUAN: June 1952, Kondo. ROTA: May 1958, Krauss; Isosan Isthmus, Oct. 1945, Necker. GUAM: Fullaway, Hornbostel, Cruz; Barrigada, Mar. 1958, Snyder; Piti, June, July, Oct. 1936, Swezey; Pt. Oca, Oct. 1945, Bohart and Gressitt.

PALAU. 22. BABELTHUAP: Ngerehelong, Ngaremlengui, Melekeiok, Ngiwal, E. Ngatpang, May, June, Dec. 1951, 1952, 1957, Sabrosky and Gressitt. KOROR: Apr., May, July, Aug., Sept. 1951, 1952, 1957, Beardsley, Gressitt, Sabrosky. PELELIU: Apr. 1936, Ono.

YAP. Yap: 24, Mar., Sept., Oct. 1952, 1954, Beardsley and Krauss; Mt. Gilifitz, 150 m., Nov. 1952, Gressitt; Kolonia, Mar., June, July, Aug. 1950, 1954, 1957, Beardsley, Goss, Sabrosky; Dugor, July, Aug. 1950, Goss; Ruul Distr., July, Aug. 1950, Goss; Weloy, June 1957, Sabrosky; Nif-Guilifez, Sept. 1939, Esaki.

CAROLINE ATOLLS. 31. Fais: Oct. 1952, Krauss. Ifaluk: Ifaluk I., Aug., Sept. 1953, Bates. Pingelap: July 1949, Owen. Kapingamarangi: Touhou I., July 1954, Niering; Werua I., Aug. 1954, Niering; Taringa I., July 1954, Niering.

TRUK. 16. Wena (Moen): July 1939, Esaki; Civ. Ad. Area, Feb., Mar. 1949, Potts; N. Basin, Mt. Chukumong, Feb. 1949, Potts; E. of Pistad, Feb. 1953, Gressitt; Mt. Teroken, Feb. 1953, Gressitt. Ton (Tol): Olej, Apr. 1940, Yasumatsu and Yoshimura; Pata, Sabote-Epin, Apr. 1940, Yasumatsu and Yoshimura.

PONAPE. 12. One, Nipit (Wenah), July 1939, Esaki; Colonia, Jan., Mar. 1938, 1948, Dybas, Kuya.

KUSAIE. Five. Funaunpes: 1 m., Jan. 1953, Clarke; Minof [?], Apr. 1953, Clarke; Mutunlik, Jan., Feb. 1953, 22 m., Clarke.

MARSHALL IS. 107. Ujelang: Ujelang I., Feb., Oct. 1952, 1953, Fosberg, Beardsley. Eniwetok: Dec. 1950, Oshiro; Parry I., Aug. 1956, Tuthill; Igurin I., Aug. 1956, Tuthill; Aniyaanii I., Aug. 1956, Tuthill; Japtan I., Aug. 1956, Tuthill. Rongelap: Rongelap I., Oct. 1953, Beardsley. Lae: Lae I., Jan. 1952, Fosberg. Kwajalein: Mar., Feb., Aug. 1953, 1954, 1958, Clagg, Krauss, Hall; Ebeye I., Oct. 1953, Beardsley. Namorik: Namorik I., Sept. 1953, Beardsley. Namu: Namu I., Oct. 1953, Beardsley. Jaluit: Jabor I., May 1958, Gressitt; Lejrok, Apr. 1958, Gressitt; Majurirek, Apr. 1958, Gressitt. Arno: Arno I., Oct. 1953, Beardsley; Ine I., July 1950, La Rivers. Ebon: Ebon I., Sept. 1953, Beardsley. Bikini: Mar. 1946, Morrison.

GILBERT IS. Tarawa: Nine, July 1945, Hall; Betio I., Aug., Nov. 1956, 1957, Brown, Krauss; Bairiki I., Dec. 1957, Krauss.

WAKE I. 25. Peale I., Aug. 1940, Lyons; Wake I., Feb., Apr., Nov. 1952, 1953, Fosberg, Joyce; Civ. Aeron. Ad., Nov. 1947.

This species is closely associated with man's food and his domestic animals. Larvae can develop in human feces as well as in that of many domestic animals, in many kinds of rotting vegetation, and in carrion. A complete life cycle (egg to egg) varies from nine to more than 60 days depending on temperature and larval media.

The names *vicina* Macquart and *nebulo* Fabricius are frequently applied to male individuals of this species from the Old and New World tropics. Those with a relatively smaller quotient obtained by dividing the narrowest measured frons width by the greatest head width have been determined as *vicina* and *nebulo,* while those from the north temperate parts of Europe and North America, with a relatively larger quotient, are usually determined as *domestica.*

The 86 Micronesian male specimens measured have a mean frons to head ratio of 0.0956 ± 0.0182 (standard deviation) with a range of 0.057 to 0.155. Thus all three socalled "subspecies" of *domestica* based on ratios given by Patton and Senior-White (1924, Indian Mus., Rec. **26**: 562-563), van Emden [1948, Exped. S. W. Arabia, British Mus. (N. H.) **1**: 173] and Sacca (1953, Rivista Parasit. **14**: 93) are in Micronesia. These ratios from various localities in Micronesia are summarized in table 3.

Table 3.—Mean ($\bar{x}$) frons to head ratios with standard deviations (S.D.), numbers measured (No.), and range of male Musca domestica in Micronesia.

Locality	$\bar{x}$	S.D.	No.	Range
Jaluit	0.0733	0.0166	3	0.057–0.098
Truk	0.0805	0.0168	4	0.067–0.105
Kapingamarangi	0.0810	0.0171	7	0.058–0.098
Wake	0.0900	0.0073	7	0.080–0.099
Yap	0.0910	0.0181	6	0.064–0.114
Volcano	0.0910	0.0094	4	0.082–0.104
Ponape	0.0937	0.0246	3	0.770–0.121
Kwajalein	0.0942	0.0123	19	0.068–0.113
Bonins	0.0980	0.0134	13	0.083–0.120
Palau	0.1040	0.0141	5	0.092–0.127
S. Marianas	0.1086	0.0186	9	0.065–0.127
Eniwetok	0.1228	0.0221	6	0.101–0.155

The means obtained from small isolated samples in widely separated regions are often highly significant statistically, but similar ratios obtained from intermediate localities tend to blend and individuals are frequently found in the same locality which can be placed in each of the three "subspecies." Since the few other characters, such as proportional length of the two anterior postsutural *dc* bristles to the two postsutural pairs, as well as the extent of the yellow color on the abdomen appear to be genetic, there is no reason to retain the names *vicina* and *nebulo*. I follow Sacca [1956, Inst. Super. Sanita **1** (1): 141] in the belief that there is a series of forms or a cline *sensu* Huxley involved, and subspecific names are therefore not applicable.

Subgenus **Byomya** Robineau-Desvoidy

Byomya Robineau-Desvoidy, 1830, Acad. Roy. Soc. Sci. France, Mem. **2**: 392 (type, *N. tempestiva* Fallén).

Biomyia Malloch, 1925, Ann. Mag. Nat. Hist., IX, **15**: 135 (emended spelling).

Musca (*Biomyia*) Malloch, 1925, ibid., IX, **16**: 373.—van Emden, 1939, Ruwenzori Exped. **2** (3): 77.

Propleura and all parts of suprasquamal ridge and tympanic pit bare.

83. **Musca (Byomya) sorbens** Wiedemann (fig. 27, *e*).

Musca sorbens Wiedemann, 1830, Aussereur. Zweifl. Ins. **2**: 418 (no. 58).
Musca humilis Wiedemann, 1830, ibid., 418 (no. 59).
Musca spectanda Wiedemann, 1830, ibid., 419.
Musca latifrons Wiedemann, 1839, ibid., 656.
Musca mediana Wiedemann, 1839, ibid., 657.
Musca vetustissima Walker, 1849, List Dipt. Ins. Brit. Mus. **4**: 902.
Musca pumila Macquart, 1850, Dipt. Exot., Suppl. **3**: 58.
Musca sordidissima Walker, 1864, Linn. Soc. London, Proc. **7**: 216.
Musca angustifrons Thomson, 1868, K. Sven. Freg. Eugenies Resa, Dipt., 546.
Musca scapularis Rondani, 1875, Mus. Civ. Stor. Nat. Genova, Ann. **7**: 428.
Musca eutaeniata Bigot, 1887, Soc. Ent. France, Bull. **12**: 605.
Musca biseta Hough, 1889, Acad. Nat. Sci. Philadelphia, Proc., 173.
Musca dichotoma Bezzi, 1911, Lab. Zool. Portici, Bull. **6**: 93.
Musca promiscua Awati, 1920, Indian Jour. Med. Res. **7**: 584.
Musca minor Patton, 1933 (*nec* Marquart), Trop. Med. Parasit., Ann. **27**: 397.

Thorax with a pair of conspicuous subshiny stripes; presuturally, each stripe is sometimes separated anteriorly into two vittae by a grayish pruinescent streak in presutural plane of *dc* bristles. *Dc* mostly 2: 4. Abdominal ground color variable, but usually entirely fuscous in female; somewhat variable in male, as in *domestica*. Male frons narrower than distance across posterior ocelli inclusive (fig. 27, *e*).

This species appears to be better able to resist desiccation and higher temperatures than *domestica*. Adults are very annoying to man because of their habit of congregating on any moist or mucous surface, especially in the early morning and late afternoon. Larvae probably will be found to develop in as diverse substances as *domestica*; but in nature they seem to prefer mammalian feces. It is possible that the last instar is capable of living on a minimum of nutrient material which might soak into relatively dry soil below the original nidus. This may account for their large numbers in semidesert to desert areas.

DISTRIBUTION: Tropics and semitropics of Old World and Australia; Micronesia (all parts except Volcano Is.).

BONIN IS. 41. CHICHI JIMA: 1931, Motoke and Ise; July 1957, Bohart; Omura, Okumura, Miyanohama, Sakai-ura, Minato-ko, Tatsumi-wan, Apr., May, June 1958, Snyder; Minami Jima, May 1958, Snyder. ANI JIMA: Senzan, Southwest Bay, May 1958, Snyder. OTOTO JIMA: Kammuri-iwa, Hirone, Apr., June 1958, Snyder. HAHA JIMA: June-Aug. 1949, Mead.

N. MARIANA IS. 30. AGRIHAN: July 1951, Bohart. PAGAN: July 1951, Bohart; Songsong, Songsong-Regusa, Laguna, Apr., 1940, Yasumatsu and Yoshimura. ALAMAGAN: July 1951, Bohart.

S. MARIANA IS. 196. SAIPAN: June 1951, Bohart; As Mahetog Area, Nov., Dec. 1944, Dybas, Edgar; Garapan, Mar. 1940, Yasumatsu and Yoshi-

mura; Tapocho, May 1940, Yasumatsu and Yoshimura. TINIAN: Mar. 1945, Dybas. AGIGUAN: May-June 1952, Kondo. ROTA: June, July 1925, 1952, Hornbostel, Kondo; Teteto-Tatacho-Sonson, Nov. 1937, Esaki. GUAM: May 1956; 1926; 1911, Clagg, Hornbostel, Fullaway; Libugen, Nov. 1936, Swezey; Tijan, Apr. 1936, Bryan; Machanao, May, Aug. 1936, Usinger, Swezey; Tarague, Apr. 1936, Bryan; Pt. Oca, Mar., May, Nov. 1945, 1952, Bohart, Gressitt; Barrigada, Mar., Aug. 1936, 1958, Swezey, Snyder; Agana, May 1936, Usinger; Piti, May, June, July, Oct. 1936, Swezey; Orote Pen., Apr. 1936, Bryan; Mt. Tenjo, May 1936, Bryan; Pago Bay, June 1945, Dybas;

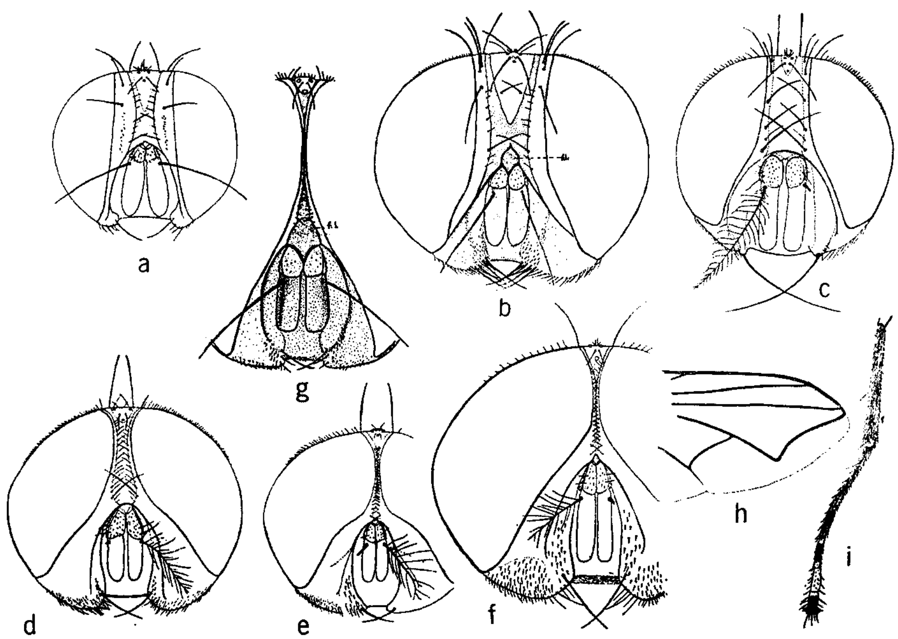


FIGURE 27.—**a-f**, Heads, frontal view: *a, Fannia pusio,* female; *b, Ophyra chalcogaster,* female; *c, Dichaetomyia rota,* male; *d, Musca domestica,* male; *e, M. sorbens,* male; *f, M. hervei,* male. **g**, *Ophyra chalcogaster,* male frontofacial portion of head; **h**, *Musca hervei,* apex of wing; **i**, *Limnophora bracteola,* male, dorsal view of fore tibia and tarsus.

near Ylig, Mar. 1958, Snyder; Talofofo, Dec., Feb., Apr., June, Aug. 1936, 1952, 1957, 1958, Usinger, Bryan, Krauss; Mt. Bolanos, Aug. 1952, Krauss; Umatac, Mar., May 1945, 1958, Bohart and Gressitt, Snyder; Merizo, June 1936, Usinger; Port Ajayan, June 1945, Dybas.

PALAU. 32. NGAIANGL: May 1957, Sabrosky. BABELTHUAP: Ngerehelong, Ngardmau, Ngiwal, Ngaremlengui, Melekeiok, Irrai (Airai)-Ngarsung, May, June 1957, Sabrosky. KOROR: Apr., June, Aug., Nov. 1951, 1953, 1957, Beardsley, Gressitt, Sabrosky. PELELIU: North end, May 1957, Sabrosky.

YAP. 119. RUMUNG: June 1957, Sabrosky; southern part, July-Aug. 1950, Goss. MAP: Chol, June 1957, Sabrosky; southern part, July, Aug. 1950, Goss; Tarang I., June 1957, Sabrosky. YAP: Mar., July, Aug., Sept. 1951, 1952, 1954, Beardsley, Gressitt, Krauss; Nif-Guilifez, Sept. 1939, Esaki; Dugor-Rumu, 10 m., Nov. 1952, Gressitt; Weloy, June 1957, Sabrosky; Gagil Distr., July, Aug. 1950, Goss; Kolonia, Mar., Apr., June, July, Aug. 1950, 1954, 1957, Goss, Beardsley, Sabrosky; Mt. Matade (Madaade), 60 m., Dec. 1952, Gressitt; Ruul Distr., July, Aug. 1950, Goss; Rul-Nif, Nov. 1939, Esaki; Ruul-Nif-Ngof, Sept. 1939, Esaki; Giliman, June 1957, Sabrosky; central part, July-Aug. 1950, Goss.

CAROLINE ATOLLS. 321. TOBI: Sept. 1952, Krauss. PULO ANNA: Sept. 1952, Krauss. SONSOROL: Sept. 1952, Krauss. NGULU: Ngulu I., Oct. 1952, Krauss. ULITHI: Asor I., Falalop I., Fassarai I., Mogmog I., Potangeras I., Sept., Oct., Nov. 1947, 1952, 1956, Krauss, Dybas, McDaniel. WOLEAI: Woleai I., Falalis I., Utagal I., Feb., Sept. 1952, 1953, Krauss, Beardsley. IFALUK: Ifaluk I., Feb., Aug., Sept. 1952, 1953, Krauss, Beardsley, Bates. FARAULEP: Fuasubukoru I., Feb. 1953, Beardsley. ELATO: Elato I., Feb. 1953, 1954, Beardsley. LAMOTREK: Lamotrek I., Feb. 1953, Beardsley. SATAWAL: Feb., Sept. 1952, 1953, Krauss, Beardsley. NOMWIN: Nomwin I., Fananu I., Feb. 1954, Beardsley. LOSAP: Pis I., Oct. 1952, Beardsley. NAMOLUK: Namoluk I., Nov. 1952, Beardsley. ETAL: Nov. 1952, Beardsley. SATAWAN: Satawan I., More I., Ta I., Nov. 1952, Beardsley. KAPINGAMARANGI: Taringa I., Touhou I., Werua I., Ringutoru I., July, Aug. 1954, Niering. MOKIL: Jan. 1953, Gressitt. PINGELAP: Jan., July 1949, 1953, Owen, Gressitt.

TRUK. 36. WENA (Moen): Civ. Ad. Area, Feb., Mar. 1949, Potts; South Valley, Mt. Tonaachau, Apr. 1949, Potts. TON: Mt. Unibot, Dec. 1952, Gressitt; Pata-Sabote-Epin, Apr. 1940, Yasumatsu and Yoshimura; Olej, Olej-Foup, Apr. 1940, Yasumatsu and Yoshimura. TONOAS (Dublon): Toloas, July 1939, Esaki; Toloas-Erin, Apr. 1940, Yasumatsu and Yoshimura.

PONAPE. 18. Colonia, Feb., July, Oct. 1948, 1949, 1953, Dybas, Owen, Beardsley; Agric. Expt. Sta., Jan., June-Sept. 1950, 1953, Adams, Gressitt; S. E. Nanponmal, Jan. 1953, Gressitt, Clarke.

KUSAIE. 67. Pukusrik, 1 m., Apr. 1953, Clarke; Mutunlik, 22 m., Jan., Mar., Apr. 1953, Gressitt, Clarke; Mt. Fuinkol (Fenkol), Jan. 1953, Gressitt; Mwot, Apr. 1953, Clarke; Malem, Dec. 1937, Esaki; Lele I., Dec. 1937, Esaki; 160 m., Mar. 1953, Clarke.

WAKE. Peale I., 18, Aug. 1940, Lyons.

MARSHALL IS. 246. UJELANG: Ujelang I., Feb., Oct. 1952, 1953, Fosberg, Beardsley. UJAE: Ujae I., Oct. 1953, Beardsley; Ebeju I., Bok I., Rua I., Feb. 1952, Fosberg. WOTHO: Wotho I., Feb., Oct. 1952, 1953, Fosberg, Beardsley. LAE: Lae I., Loj I., Jan. 1952, Fosberg. KWAJALEIN: Aug., Feb. 1944, 1958, Bryan, Krauss; Ebeye I., May, Oct. 1953, 1958, Beardsley, Gres-

sitt; Eru I., Oct. 1953, Beardsley; Lojjairok I., Jan. 1952, Fosberg; Enelapkan I., Aug. 1952, Fosberg. LIB: Oct. 1953, Beardsley. NAMORIK: Namorik I., Sept., Nov. 1953, Beardsley. NAMU: Namu I., Kaginen I., Oct. 1953, Beardsley. AILINGLAPALAP: Ailinglapalap I., Oct. 1953, Beardsley; Bikajela (Bigatyelang) I., Nov. 1948, Langford. LIKIEP: Likiep I., Lato I., Dec. 1951, Fosberg. KILI: Oct. 1953, Beardsley. JALUIT: Elizabeth I., Sept. 1953, Beardsley; Majurirok I., Apr., Sept. 1953, 1958, Beardsley, Gressitt; Jabwar (Jalbor) I., May 1958, Gressitt; Jibu I., Apr. 1958, Gressitt. UTIRIK: Utirik I., Dec. 1951, Fosberg. AILUK: Akulwe I., Enejomaren I., Dec. 1951, Fosberg. WOTJE: Oct. 1953, Beardsley. MAJURO: July 1944, Bryan; Ulika (Uliga) I., Sept. 1953, Beardsley. ARNO: Ine I., Bikarej I., June, July 1950, La Rivers; Arno I., Oct. 1953, Beardsley. EBON: Ebon I., Sept. 1953, Beardsley.

GILBERT IS. 104. BUTARITARI: Butaritari I., Dec. 1957, Krauss. TARAWA: Mar. 1951, Catala; Eret, Dec. 1957, Krauss; Bikenibeu I., Teaoraereke I., Taborio I., Nov.-Dec. 1957, Krauss; Betio I., Nov. 1957, Krauss; Bairiki I., Dec. 1957, Krauss. MARAKEI: Dec. 1957, Krauss. ONOTOA: July 1951, Moul.

The absence of *M. sorbens* from the Volcano Islands is probably due to absence of domestic animals.

Subgenus **Emusca** Malloch

Emusca Malloch, 1925, Ann. Mag. Nat. Hist. IX, **16**: 372 (type species, *autumnalis* de Geer; not *autumnalis* of authors = *domestica*).

Eumusca Townsend, 1911, Ent. Soc. Washington, Proc. **13**: 170; 1932, Ann. Mag. Nat. Hist. X, **8**: 369 (type, *corvina* Fabricius of Townsend = *autumnalis* de Geer). See synonyms under *Musca* (*Musca*).

Tympanic pit (fig. 1, *g*) with several long hairs or setae; remainder of suprasquamal ridge bare; propleura bare.

84. Musca (Emusca) hervei Villeneuve (figs. 1, *g*; 27, *f*, *h*).

Musca hervei Villeneuve, 1922, Sci. Nat. (Zool.) Ann. **10** (5): 335.—Patton and Senior-White, 1924, Indian Mus., Rec. **26**: 572.—van Emden, 1939, Ruwenzori Exped. 2 (3): 75.

Parafrontals in male broadly contiguous at middle of front so that at this part front is not broader than diameter of anterior ocellus (fig. 27, *f*). Front at base of antennae in female 0.30 to 0.33 of head width, somewhat narrowed at vertex. Without a row of short hairs mesad to usual row of parafrontal setulae, though one or two are occasionally present on one or both sides near middle. Thorax fuscous, grayish pruinescent, though in male it may blend from almost brown to bluish gray. With a distinct vitta on each side of each row of *dc* bristles; outer ones complete in both sexes, in females inner vittae complete, but in males they terminate at about middle of postsutural portion. *Dc* 2: 4, anterior two postsutural pairs subequal in length to anterior presutural pairs. Suprasquamal ridge not setose posteriorly, but with distinct bristle in typannal pit. Hairs on ventral surface of third wing vein often continued

basad to node; these almost as long as the one or two hairs on dorsal surface of stem vein; dorsal surface of third vein often with one or two short hairs on node. Calyptrae of male moderately dark brown hyaline; of female white.

Abdomen of female entirely dark, with silvery-gray pruinescence in form of dorsal and lateral tesselations; of male yellow to a variable degree on tergites 1 to 3 and with sparse to abundant silvery pruinescence. Sternites are black except in a few teneral males which have them fulvous brown. Ventral portion of tergites adjacent to sternites in females are black but occasionally with brown to fulvous brown streaks; in males, ventral parts of tergites are more variable in color and often only margins of ventral parts of tergites are outlined with black.

DISTRIBUTION: China, India, Ceylon, Bonin Is., Caroline Is.

BONIN IS. 161. CHICHI JIMA: Omura, Okumura, Apr., May, June 1958, Snyder; Sakai-ura, Apr., May 1958, Snyder; Yoake Yama, Miyanohama, Apr. 1958, Snyder; Futami-ko, May 1956, Clagg. ANI JIMA: Sen-zan, May 1958, Snyder. OTOTO JIMA: Kammuri-iwa, June 1958, Snyder; Hirone, Apr. 1958, Snyder.

PALAU. 60. 1934, Yoshino. BABELTHUAP: Ulimang, Dec. 1947, at light; grassy uplands, Dybas; Ngerehelong, May 1957, on cow, Sabrosky; Ngiwal, May 1957, jungle, Sabrosky; Imeliik, Netkeng, June 1957, Sabrosky; Airai, Ngarsung, May 1957, at light, Sabrosky. KOROR: Mar., Apr., Aug., Nov. 1947, 1953, 1957, Dybas, Beardsley, Sabrosky. NGAIANGL: May 1957, Sabrosky.

YAP. 19. YAP: July, Aug. 1951, 1952, Gressitt, Krauss; Kolonia, June, July, Aug. 1950, 1957, Goss, Sabrosky; South central part, July, Aug. 1950, Goss; Mt. Madaade (Matade), 60 m., Dec. 1952, Gressitt; Ruul-Nif, Sept. 1939, Esaki; Ruul-Ngof-Nif, Sept. 1939, Esaki. RUMUNG: Oct. 1952, Krauss; southern part, July, Aug. 1950, Goss.

CAROLINE ATOLLS. ULITHI: Two, Falalop I., Sept. 1956, McDonald.